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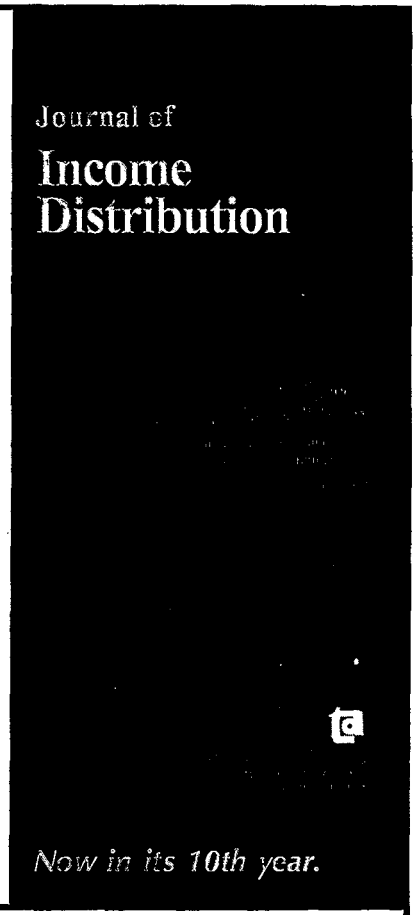

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RESOURCE ALLOCATION: A HAYEKIAN PARADIGM FOR MARITIME CONGLOMERATES

GARY A. LOMBARDO AND ROBERT F. MULLIGAN

Resource allocation, a ubiquitous process in organizations, represents a curious dilemma for strategic leaders. Although the expressed purpose of allocating resources is to position organizational subunits for the future, the relevant management literature recognizes that funds are given, in many cases, based on past performance. The implied algorithm is "past success leads to future success." This approach may be effective during evolutionary time periods, but it can be ineffective during dramatic shifts in the marketplace. This is especially true for conglomerate organizations interacting with numerous task environments representing multiple and differing industry sectors.

The resource allocation process in a conglomerate organization is critical to the enterprise's ability to undergo strategic adaptation to realign the corporate mission and strategic goals during environmental shifts. The focus of this article is to respond to the question, "How should a conglomerate organization decide to allocate resources to its subunits?" The resource allocation process is embedded in a series of events beginning with activities in the task environment and ending with the organization's strategic adaptation efforts (Figure 1). This conceptual scheme attempts to sequence the activities or processes through which firms adapt to compete in a changing task environment.

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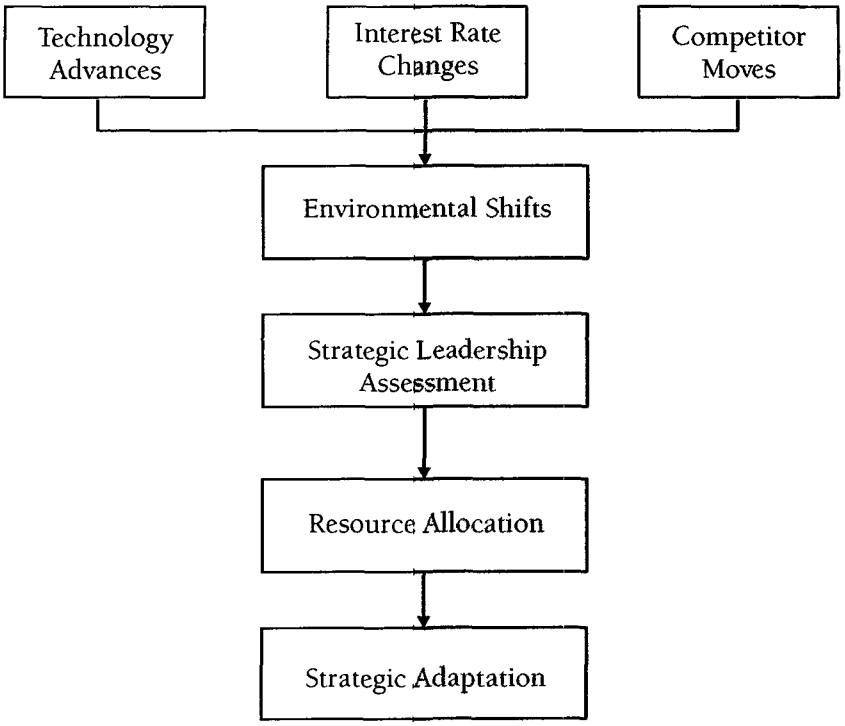
Figure 1
Events Related to an Organization's Resource Allocation Process



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The resource allocation process is influenced by the antecedent events of environment shifts and strategic leadership assessment. As the organization recognizes environmental shifts—notably, technology advances, interest-rate changes, and competitor moves—the organization's dominant coalition is faced with the need to assess how to allocate resources to maintain or enhance organizational competitiveness. Given the dynamic nature of most task environments, the open-system orientation results in exogenous influences changing past resource allocation patterns. Competitor moves and technology advances typically influence an inherently imitative, "me-too strategic adaptation" that results in the emulation of best industry practices. To encourage effective entrepreneurial efforts and offer a prescription for conglomerates to implement a "first-mover strategic adaptation," this investigation focuses on the influence of interest-rate changes on the resource allocation process.

The environment confronting firms includes currently available technology, prevailing market interest rates, and competing firm behavior. Whenever one of these components changes, or is expected to change, firms face an environmental shift. Technological advances present the challenge of combining

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existing installed capital with newer capital and other resources to achieve a higher rate of return. As technological improvements lower the costs of production, decision makers discover that more and more of their contemplated investment possibilities can be expected to yield a profit. This occurs even if the market interest rate is constant, and in fact, might not occur if the market interest rate rises to exactly offset the advantage offered by the new technology. Technological change may also facilitate a firm's penetration of a new market sector.

Changes in interest rates reposition the margin between profitable and unprofitable investment projects. The market interest rate represents the opportunity cost for any resource allocation within the firm, or for allocating resources from outside the firm. Projects with expected returns lower than the market rate of interest expected to prevail over the life of the project normally are not undertaken. An exception occurs in the case of loss-leader activities which are undertaken only because they are expected to lead to more profitable opportunities later. Taken together, loss-leader and any activities piggybacked on a loss-leader must yield an expected return at least as high as the market interest rate.

Firms also respond to competitor moves. Although "first mover" firms receive the most attention for their entrepreneurial prowess, firms are compelled to respond to the actions of other firms. Often the response is mere imitation of the first mover, but significant entrepreneurial activity also occurs when firms incorporate lessons learned in what may be termed "innovative imitation."

Environmental shifts occur when any of the three components of the business environment change: technology, interest rates, or competitor moves. Firm managers perceive and anticipate the environment they operate in, and respond by constructing contingency plans. Contingency planning may be informal and vague, as, for example, managers develop simple and often unarticulated rule-of-thumb responses in advance of interest-rate changes. The firm's task environment changes as technology improves, as interest rates are adjusted in the market or by the central bank, or by competitor moves. Firm managers seek to anticipate the future task environment and respond appropriately.

Firm management performs strategic leadership assessment in two stages: the first stage consists of an assessment of the future task environment and the second stage consists of formulating an appropriate response. Firms often avoid conscious consideration of this function, maintaining the *status quo* by default in a mistaken effort to avoid transactions and information costs. Firms have an opportunity to exercise informed decisions or simply rely on adherence to traditional behavior and practice, and traditional products and markets. Firms face two challenges: first, accurate assessment of the future task environment, and second, correct formulation of a viable strategy. Failure in either is costly. Different firms have different approaches to strategic

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leadership, for example, some firms pursue increased market share while others seek increased profits.

Coase's (1988a, p. 7; 1988b, pp. 38-46) insight that the division of labor is organized in firms, rather than through spontaneous voluntary contracting among individuals in order to minimize transaction costs, implies that the transaction costs which can be avoided through firm organization more than offset any inefficiencies imposed by firm organization. Presumptively, the mere existence of firm organization demonstrates that it successfully minimizes transaction costs, at least most of the time.

Firms operationalize their strategic thinking by allocating resources among productive internal activities. Often a firm's mission statement and strategic planning documents suggest one emphasis for the firm, but resource allocation indicates the firm's real priorities and true intentions. Resource allocation cannot give misleading signals. Firms realize strategic adaptation proactively or by default. Strategic adaptation occurs by default through the accumulation of successive allocation decisions, unless a firm's leadership intentionally defines a strategic vision. Often, passively managed firms attain a level of structural maladaptation, but periodically overcome maladaptive inefficiencies through massive reorganization. This process can be seen as evidence of an attempt to avoid transaction costs (Coase 1988a, pp. 43-46).

This article presents a synthesis between Hayek's theory of production structure and investment, and the organizational strategy literature. The rest of this research investigation is organized as follows: "Literature Review" surveys the organizational strategy literature with respect to resource allocation issues; "Exogenous Challenges: A Prescriptive Application of Austrian Capital Theory" discusses how Austrian capital theory can be used to guide resource allocation within firms; "Implications for Maritime Conglomerates" illustrates an application to a particular type of diversified business enterprise; and "Conclusion" presents concluding remarks.

Literature Review

Resource Allocation

The importance of resource allocation activities has long been recognized by management scholars (Pondy 1970) as well as economists. The resource allocation process is a major aspect of intraorganizational dynamics, setting the tone for and influencing subunit success as the antecedent for organizational evolution. The complexity and tensions inherent in the resource allocation process are derived from the dynamic nature of the task environment in which the organization operates. In a static environment, resource allocation patterns would be unchanging; a previous year's allocation would be replicated during subsequent annual cycles. Precisely because fundamental changes in task environments occur, an effective organization is required to adapt strategically to maintain and ideally enhance its industry position in terms of sales and profitability. If core practices remain unchanged in this

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dynamic context, lowered performance outcomes are likely (Schumpeter 1942; Hannan and Freeman 1984; Tushman and Anderson 1986; Levinthal 1994). Exogenous challenges require that strategic leaders change resource allocation patterns.

Five distinct streams within the management literature argue in favor of effective resource allocation as essential for strategic adaptation: contingency and resource dependence literature (Thompson 1967; Pfeffer and Salancik 1978); strategic change literature (Ginsberg 1988; Rajagopalan and Spreitzer 1997); organizational learning and evolution literature (Nelson and Winter 1982; Tushman and Romanelli 1985; Levinthal and March 1993); ecologists' literature (Hannan and Freeman 1984; Haveman 1992; Usher and Evans 1996); and external institutional pressures literature (Selznick 1957; Stinchcombe 1965; Miles and Cameron 1982; Haveman 1993; Levinthal and March 1993; Kraatz and Zajac 1996).

The resource allocation process is recognized as crucial to organizational success. This testament to the importance of funding subunits appropriately is constrained by the fact that all enterprises have finite resources. Resource allocation breeds intraorganizational competition due to this finite and scarce nature of funding. As a result, subunit managers, recognizing that future resource availability may become less certain, find it difficult to justify self-restraint (Kramer 1989). The priority to get as much funding as possible during each resource allocation cycle results in the suboptimal communal management of a shared resource (Komorita and Parks 1994).

A Strategic Approach

The resource allocation process should be able to develop strategic flexibility to respond to changing environmental conditions (Hitt, Keats, and DeMarie 1998). The process should inspire a level of subunit teamwork and interpersonal dynamics that does not cast the effort in a "winners and losers" context at the subsidiary level but rather, offers all participants a supportive environment. The specific allocation of resources represents the content dimension whereby organizational performance is strengthened. The process aims at increased market share and/or profitability, ultimately resulting in increased resources to be allocated in subsequent cycles. Resource allocation efforts should be forward-looking, supporting the organization's vision for its future. Thus, the process should be systematic, rather than a series of annual episodic events devoid of continuity of purpose.

A systematic view of the resource allocation process emphasizes the need for strategic leaders to connect present behavior (resource allocation) to the achievement of corporate objectives (satisfying the organization's mission). This temporal integration (Jones 1988) is an essential element of the resource allocation process. If funds are committed to initiatives that fail to progress the organization in terms of goal attainment, subsequent resource allocation cycles will have diminished funds to support future strategic initiatives. Over time, the organization will suffer as shrinking resource availability will diminish the

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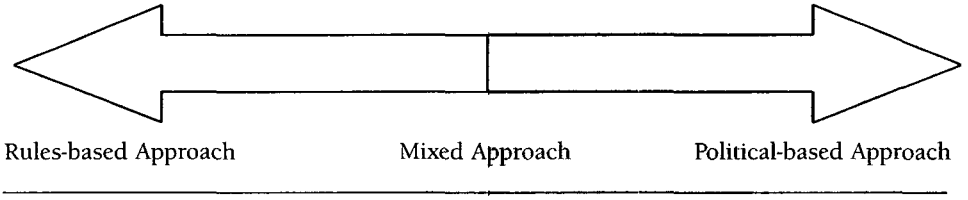
strategic leaders' ability to advance the organization's interests in terms of gaining market share and/or profitability. The strategic leaders' roles are to allocate resources to maximize total return within the constraints of the subunits' probabilistic success (Collier 1984).

Rules versus Politics

The specific resource allocation process used in a particular organization may be viewed along a continuum of choices. At one end of the continuum, the resource allocation process represents a rigid rules-based approach; at the opposite end, a pure political-based approach may be found (Figure 2).

The rules-based approach for resource allocation can follow any number of algorithms found in various organizations. This approach is defined by an adherence to pre-established policies that prescribe how resources are to be allocated to requesting subunits within an organization. One school of thought considers that objective criteria; e.g., subunit workload and relative contribution to organizational goals (Baldridge 1971), internal contextual variables; e.g., size and technology (Daft 1978), or centrality; e.g., the degree that a subunit's initiatives support the organization's mission (Hackman 1985), dominate the decision process. The ideal metric, capturing past performance and shifts in the task environment, will result in adherence to an exclusively rules-based approach. The reality is that the rules-based approach invariably uses an algorithm that is not sufficiently robust to capture the dynamic complexities as time marches forward and tends to be inward-looking at the enterprise rather than outward looking, considering environmental shifts. The inadequacy of the rules-based approach moves strategic leaders to substitute political considerations when allocating the scarce resources in an attempt to address the variables of interest not found in the rules-based algorithm.

Figure 2
Resource Allocation Process



Source: Developed by authors.

The strategic management literature has never recognized Austrian capital theory, as exemplified by the Hayekian triangle, as a source for a rules-based approach to allocation. Both the management literature and the Hayekian triangle aim at a description of behavior, not at prescription. Nevertheless, Austrian capital theory has necessary prescriptive implications for strategic decisions by firm decision makers. In contrast, the political-based approach for

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resource allocation is a function of the negotiations, compromises, and expediencies that result from the subunit discussion sessions. Both conditions of scarce and drastically changing resources encourage the creation of coalitions within the firm as well as rearrangement of coalition allies (Stevenson, et al. 1985). The resource allocation process is considered as an issue-selling effort to shape changes at the lower levels of the organizational hierarchy by focusing top management attention (Dutton, et al. 2001). In effect, issue selling represents an early stage in the change process affecting the allocation of management attention and subsequently the flow of resources to subunits. When political factors influence the resource allocation process, goals and decision criteria tend to be ill-defined. Thus, bargaining and compromise influence resource allocation outcomes (Cyert and March 1963; Baldridge 1971; Pfeffer and Salancik 1974). Bargaining and power-based mechanisms become more salient than problem-solving mechanisms to resolve subunit conflict and tension when dealing with preferences by members' identification with subunit goals (Friedkin and Simpson 1985).

To accurately describe behavior of firm-level decision makers, the most general construct combines the two competing explanations. The mixed approach for resource allocation tends to use a series of rules supplemented by political considerations. This hybrid process can result in the accrual of all the advantages and disadvantages of the two pure form approaches. Hayek (1973, p. 39) developed a sophisticated distinction between designed and grown or spontaneous orders. Spontaneous orders can be rules-based or politically managed. The combination of rules and political management leads to firm order being difficult to place in Hayek's scheme (Khalil 1995; 1997a; 1997b).

Perceived inequity in the allocation of resources will move subunits from accepting a rules-based approach to introducing political considerations for the disbursement of funds. Alternatively, leading members of subunits who perceive injustice in the resource allocation process may decide to resign their positions and seek employment elsewhere—possibly at a competitor organization.

A rules-based approach to guide the resource allocation process may be preferable if all pertinent variables of interest are captured in the algorithm for both static and dynamic environments. Static environments lead to the implementation of existing strategies; dynamic environments lead to the development of new strategies (Carpenter and Westphal 2001). As such, in effective organizations, the resource allocation process for conglomerates facing static environments is a continuation of past efforts. Conversely, effective organizations facing dynamic environments will develop new strategies and, concurrently, require new resource allocation patterns. The challenge arises for strategic leaders to incorporate relevant variables in the rules-based resource allocation paradigm. A given rule may be highly appropriate in the static environment for which it was adopted, but once the environment changes, the search for appropriate rules frequently becomes politicized.

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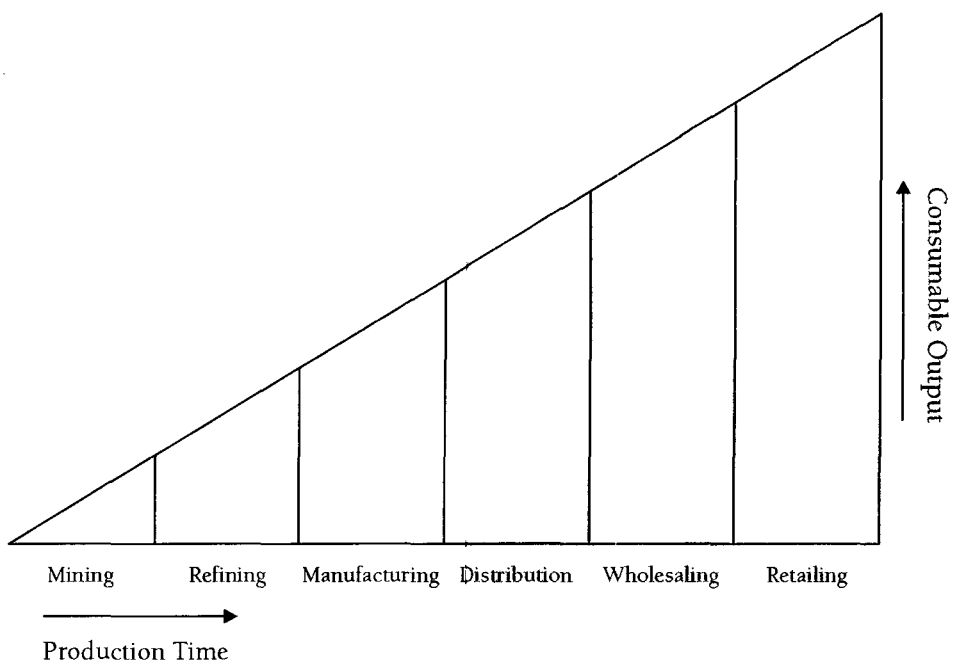
EXOGENOUS CHALLENGES: A PRESCRIPTIVE APPLICATION OF AUSTRIAN CAPITAL THEORY

The Hayekian Triangle

The Hayekian triangle (Figure 3) can be used to analyze the structure of production and capital investment, and how each process responds to the environment embodied in prevailing market interest rates. A prescriptive interpretation of the triangle would imply that it should be used to guide firms in allocating resources in accordance with prevailing interest rates. The management literature identifies other objective criteria useful to direct resource allocation for most organizations facing a single, relatively static, task environment. Their value, however, weakens when the context is a conglomerate organization facing multiple, dynamic task environments where past performance and centrality do not combine into a series of metrics that can be systematized into a workable paradigm that will lead to the appropriate allocation which can advance the organization and avoid political bickering. Conglomerate organizations offer potential savings in transaction costs over several smaller firms organized over narrower, industry-specific models (Coase 1988a, pp. 45-56).

Figure 3
The Hayekian Triangle



Source: Roger W. Garrison, *Time and Money: The Macroeconomics of Capital Structure* (London: Routledge, 2001), p. 47.

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Previous researchers have analyzed the effects of production uncertainty in one sector considering resource allocation in a two-sector model (Batra 1974; Britto 1980; Mills 1983). Consumer preferences (demand function) influence production (Harford and Park 1985). Interest rates influence consumer preferences (demand function), both through affecting households' decisions dividing disposable income between consumption and saving, and their decisions on how much, if any, consumption to fund through borrowing. Interest rates also influence firms' decisions of how much to borrow to finance production, and therefore also impact supply functions. Thus, interest-rate changes in an organization's task environment represent a strong influencing factor in consumption patterns. The research reported in this article expands the analysis beyond a two-sector model and captures the influence of interest rates.

Microeconomic Approach

The Hayekian triangle (Hayek 1931, p. 39; subsequently developed by Hayek 1941, 1966, 1967, 1969) is a model of the production process and macroeconomic resource allocation. Although the Hayekian triangle is the foundation of Austrian macroeconomics, resources are allocated at the firm level in response to prevailing interest rates. Rather than focusing on macroeconomic resource allocation, this article examines the microeconomic process of intrafirm resource allocation. In a certain sense, prevailing market interest rates serve to coordinate the investment and production plans of diverse enterprises and assure a consistent macroeconomic production structure.

Because the triangle models production as taking place over time, the profit or value added from each stage of production must equal or exceed the interest rate available on financial assets. The interest rate functions as an economic opportunity cost. When interest rates increase, the structure of production becomes less roundabout, redistributing productive resources away from producer goods toward consumer goods. When interest rates rise, higher rates of return in production are necessary to compete with the higher-yielding financial instruments. Investment spending necessarily contracts because only a smaller number of prospective investment projects can pay off at the new, higher interest rate. The Hayekian triangle, and the production structure it illustrates, becomes more steeply sloped as the base shortens. Resources are shifted from early to late stages of production, reflecting consumers' new desire for more consumption and less saving.

When interest rates fall, the structure of production becomes more roundabout, redistributing marginal resources toward productive activities with lower rates of return. The Hayekian triangle becomes flatter as the base lengthens and the slope of the hypotenuse decreases. Generally, more final output can be produced because more use is made of physical capital in the more roundabout, and more time-consuming, production process.

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Business Cycles

Austrian capital theory, however, distinguishes two kinds of interest-rate changes: preference-induced and policy-induced. Preference-induced changes in interest rates occur infrequently, and probably only gradually. Comparative advantage accrues to firms which recognize these changes and position themselves accordingly. Policy-induced interest-rate changes are only temporary and fool firms into allocating resources as if interest rates had changed permanently. Firms that take the bait find they have invested in inappropriate and unprofitable production projects when interest rates return to natural levels. Comparative advantage here accrues to firms which accurately discern temporary, policy-induced interest rate changes and avoid allocating resources based on those misleading interest rates, while taking full advantage of temporarily low loan rates.

Bischoff's (1970) "putty-clay" model of investment emphasizes the distinction between highly liquid, uninvested financial capital and highly illiquid, installed capital equipment. A policy-induced, unnaturally and temporarily low interest rate entices firms to transform more of their liquid savings or "putty" capital into illiquid "clay" capital. The transformation is asymmetric because it is easy to exchange cash for capital equipment when the interest rate and the return on marginal equipment is low, but once the interest rate increases, it becomes difficult to reverse the process by exchanging low-yielding equipment for cash.

Policy-induced interest-rate changes lead to the business cycle (Hayek 1967, pp. 136-39; Garrison 1986, p. 440; 1988; 2001, pp. 71-73). The boom is caused by lower than natural interest rates that lead to employment of lower-yielding and less competitive resources, including land, labor, and capital. Presumably this applies equally well to entrepreneurial talent, because even the least-talented individuals may succeed as entrepreneurs during a boom. Recession occurs because the excessively drawn-out production process cannot supply consumers indefinitely. Given low yields on marginal capital, both resource employment and consumption fall. As interest rates fall in response to central bank injections of new money, the artificially low interest rate drives a wedge between saving and investment. The interest rate can be described as artificially low because it is lower than consumers' time preference. Increased saving entails an initial contraction of consumer-good industries. In contrast, however, credit expansion lowers interest rates, simultaneously reducing the attractiveness of saving and causing potential savers to spend more of their income on consumer goods. During the boom caused by a policy-induced credit expansion, the curvilinear triangle does not reflect consumers' true time preferences. The interest rates prevailing in, and discounting inputs from outputs of, each stage—lower in early stages and higher in late stages—no longer reflect the natural rate of interest. This applies to both real and nominal interest rates, and the credit-induced curvilinear production structure is never sustainable. The structure of production ultimately responds to unsustainably low interest rates by simultaneously attempting to

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deliver more consumer goods in the late stages and more producer goods in the earlier stages–an impossible task.

The Hayekian Theory of Production Structure

Firm-level decision makers actually perform time discounting with prevailing market nominal interest rates representing their opportunity cost, rather than subjective rates of time preference. These objectively observable interest rates are more likely to reflect actual, subjective time preferences if they are not being manipulated by the central bank. Austrian business cycle theory posits that central bank credit expansion causes business cycles. Decision makers are free to adjust production plans, and do so in response to technological advances, disappointed expectations about resource availability and cost, or about output demand and price, and changes in interest rates.

The concept of stages of production is subjective (Garrison 1985, p. 167; 2001, p. 46), thus specific industries often operate simultaneously in several different stages, and any empirical classification of industrial sectors can only be of which stage predominates. For example, in a maritime conglomerate, dry bulk shipping is an early-stage activity if the freight is used in a manufacturing process, but late-stage if unprocessed freight is delivered directly to consumers. Crude petroleum shipping is always an earlier-stage productive activity compared to shipping refined petroleum products, but because petroleum refining requires little time, crude petroleum shipping can often be late-stage compared with much dry bulk shipping. Containerized shipping is predominantly of final manufactured output and thus constitutes a late stage of production, but exceptions are inevitable. Furthermore, many resources, including producer goods, are nonspecific to a particular stage of production. Because each firm can use many resources in multiple processes, firms often operate simultaneously in different stages of production. This is especially true for maritime conglomerates.

Capital equipment–for example, ships, dock facilities, rolling stock, and ancillary infrastructure–may substitute or complement other items of capital equipment. Furthermore, this is a general property of all resources. For any equipment item, labor may be either a substitute or a complement; different kinds of labor may be substitutes or complements for a given equipment item, or for given other kinds of labor. Different productive resources also have various degrees of substitutability and complementarity (Garrison 1985, p. 168; 2001, p. 49). Inputs are combined at each stage of production. Stages of production are not instantaneous; thus, time preference assures that outputs from each stage have greater expected value than the sum of inputs (Mises 1966, pp. 483-88; Rothbard 1970, pp. 323-32; Garrison 1985, p. 169; 2001, p. 46). Coordination performed by firm-level decision makers produces surplus value and is essential for production to take place. In the Austrian view, the increase of value in production over time is due exclusively to:

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(1) the time span required for each stage of the production process;

(2) the fact of time preference, which discounts the inputs into each stage, compared to the expected output from each stage;

(3) the economic value consumers confer on the final output which they use to satisfy their wants; and

(4) the coordination provided by the authors of the production plan, often described as entrepreneurship or managerial services. This is the mechanism through which firms minimize transaction costs (Coase 1988a, pp. 38-40).

Entrepreneurs compete to satisfy consumer wants with the shortest possible delay, thus earning the highest return. The interest rate is the rate of time discount implicit in the pattern of prices of productive resources, including capital equipment. Garrison (1985, pp. 169-70; 2001, p. 50) cautions this is not necessarily the same as the loan rate determined in the loanable funds market, though he also acknowledges the market process eventually adjusts the loan rate to the broader market rate of interest. In the Austrian view, determinants of the broader market interest rate are not exhausted by the determinants of the loan rate in the loanable fund market (Rothbard 1970, pp. 321-23), although the slope of the hypotenuse of the Hayekian triangle reflects the interest rate determined in the loanable funds market (Garrison 2001, p. 50).

The earlier the stage of production, the greater the period of time separating existing capital or producer goods from the prospective consumer goods, and the greater the difference in value due to time discounting between producer and consumer goods. Thus, the value of capital equipment used exclusively in early stages of production is more sensitive to interest-rate changes (Garrison 1985, p. 179; 2001, p. 72).

Changes in time preference are particularly punishing to the maritime industry, which depends on an especially long-lived capital stock. Government intervention to support the maritime industry may be justified in at least two ways:

(1) national security considerations; and

(2) most changes in interest rates, specifically those not directly caused by an overall change in time preference, are engineered by the central bank.

The rationale of subsidizing or otherwise compensating a highly capital-intensive industry to offset the impact of central bank policy clearly demonstrates how government interventions tend to proliferate. An enlightened monetary policy should focus on price and interest-rate stability, and would then provide little justification for government support.

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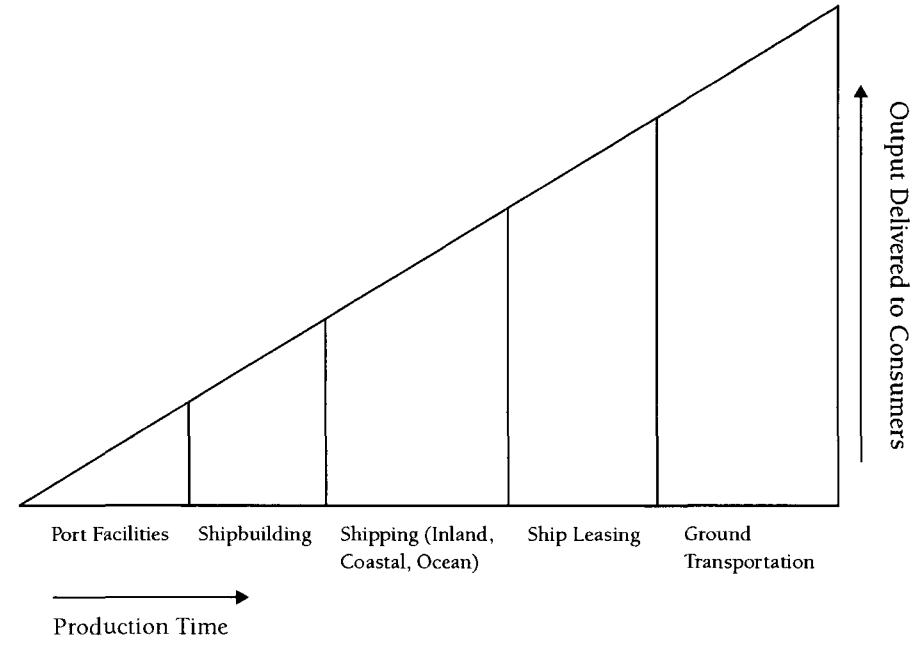
Implications for Maritime Conglomerates

Maritime firms have to respond to environmental constraints including the term structure of interest rates prevailing at any point in time. Long-run comparative advantage accrues to firms that successfully distinguish between permanent changes in time preference and transitory interest rate fluctuations arising from monetary policy. Firms allocate resources in response to expected consumer demand for consumable output and expected opportunity cost. In the subjectivist theory of a capital-using economy, decision-making planners act as the subjects of productive activity, creating consumable output as the object (Garrison 1985, pp. 164-68; 2001, p. 15). Consumers confer value on consumable output because they desire it to satisfy their wants. The value of producer goods is derived from the consumable output they are expected to yield and expected consumer demand for the output. The earlier firms intervene in productive activity, the greater the opportunity to increase the final yield of consumable output. Thus, the final output should be greater in value the more roundabout the production process, or in other words, the longer the duration of the production process. This intuition is supported by the general observation that the more roundabout the production process, the greater the scope for employment of capital equipment.

Figure 4
A Generic Maritime Conglomerate: Production and Capital Structure



Source: Developed by authors based on Roger W. Garrison, *Time and Money: The Macroeconomics of Capital Structure* (London: Routledge, 2001), p. 47.

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If time preference was sufficiently high, no shipping could take place, and impatient consumers would be necessarily limited to immediate consumption of locally obtained raw materials. Interest rates facilitate intertemporal coordination of resource allocation in production plans by clearing the loanable funds market (Garrison 1986, p. 440; 2001, p. 39). In this regard, disequilibrium interest rates play the same role as market prices in signaling opportunities for entrepreneurial discovery by decision makers (Kirzner 1984a, p. 146; 1984b, pp. 160-61; 1997), and firms respond by adjusting the production structure.

Conglomerate maritime businesses are simultaneously engaged in several business sectors. Most nonpetroleum bulk shipping constitutes an early stage of production. Most petroleum shipping and containerized shipping constitute late stages. The resource allocation process is crucial to continued organizational success. Maritime firms do not produce consumable output but provide transportation services, moving final output to consumers. Maritime firms also transport intermediate goods-in-process from earlier to later stages of production. Productive activities maritime firms engage in include port facility construction and operation, shipbuilding, cargo shipping, ship leasing, and overland transportation. A maritime firm constitutes a conglomerate if it engages simultaneously in two or more different activities. Conglomerate organization offers additional scope for minimizing transaction costs (Coase 1988a, p. 45).

Port facilities must be available before the conglomerate can potentially contemplate shipping operations. Because port facility planning and construction requires the longest lead-time, the port is the capital equipment item which constitutes the earliest stage of production for a maritime conglomerate. Port facility operation is more flexible and must occur as a stage of production in between any other two stages, but operations can be curtailed without liquidating the capital equipment, as dockworkers can be hired and laid off as needed.

Shipbuilding is the next stage of production for a maritime conglomerate. Though less expensive than corresponding port facilities, and thus requiring less time and effort to organize their financing, ships are expensive, and extremely long-lived, capital equipment items. Few industries are as capital intensive, or employ such a long-lived capital stock.

Shipping is certainly the main activity of any maritime firm. The more specialized a firm's fleet, the more likely shipping operations will fall into specific early, middle, or late stages of production, as discussed earlier. However, because different kinds of shipping–for example, ocean, coastal, or inland–can fill either earlier or later stages, which vary dramatically across maritime firms depending primarily on their clients, we treat this whole, admittedly diverse, process as primarily a late stage of production. Two justifications for this classification are (1) the greater value of more nearly final output, as opposed to unprocessed raw materials, and (2) the increasingly prevalent

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practice of shipping clients to locate manufacturing operations close to raw materials and labor.

Ship leasing is a class of activity almost unique to the maritime industry, and was created in response to the low flexibility imposed by long equipment lives and high finance costs. When shipping demand or the interest-rate climate are such that a maritime firm would otherwise let its ships be idle, it can lease the ships to other operators.

Overland transportation is an activity that marks a maritime firm as a true conglomerate. Because it generally moves final produced output into a distribution network of wholesalers and retail outlets, it is generally the last step in the production process contributed by the maritime firm.

The resource-allocation process plays out in the context of differing subunit preferences, potentially resulting in tension and periodic conflict that may lead to dysfunctional relationships over time. Absent clearly understood and effective operational rules, the potential for heightened dysfunctional internal relationships will lead a conglomerate organization to have diminished resource bases for achieving future strategic goals. By developing an effective resource-allocation paradigm, the organization can gain market share resulting in increased profitability and continued success in the marketplace. The Hayekian triangle presents an objective measure reflecting environmental shifts by tracking interest-rate changes that affect consumer and production demand. Organizations can gain "first-mover advantages" (Thomas 1985) essential to provide the competitive advantage *vis-à-vis* their rivals while maintaining harmonious relationships among the subunits.

Table 1 illustrates how a representative maritime conglomerate should adopt a rules-based allocation paradigm. Shipbuilding and port construction are the two longest lead-time investment projects, and should receive increased emphasis when interest rates are forecast to decrease for an extended period. Firms should be especially wary against policy-induced and therefore temporary interest-rate decreases; recognizing that policy-induced interest rate cuts are likely to be transitory protects the firm from tying up liquid "putty" capital in uncompetitive, low-yielding "clay" investments for a protracted period. As late stages of production, shipping, leasing, and ground transport should receive increased emphasis when interest rates are forecast to rise for an extended period. As with temporary interest rate cuts, the same caveat applies about guarding against misleading indications from policy-induced interest rate hikes.

One activity maritime conglomerates engage in is government lobbying. It appears the incentive provided by application of this rules-based paradigm is to intensify lobbying efforts whenever the interest-rate environment is expected to change. This seems to support the view that lobbying is an inherently pernicious, self-enforcing activity. In contrast with other behavioral rules provided by this paradigm, there would seem to be an especially

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strong incentive to lobby during periods of policy-induced, temporarily high or low interest rates. At these times, firms are well justified in seeking government support to compensate for any disadvantage or expense conferred by economic policy.

Table 1[1]
Representative Maritime Conglomerate

Subsidiary	Production Stage		Interest-Rate Forecast	
	Early	*Late*	*Increase*	*Decrease*
Port Facilities	X		Decrease allocation	Invest at higher levels
Shipbuilding	X		Decrease allocation	Invest at higher levels
Shipping - Inland		X	Invest at higher levels	Decrease allocation
Shipping - Coastal		X	Invest at higher levels	Decrease allocation
Shipping - Ocean		X	Invest at higher levels	Decrease allocation
Ship Leasing		X	Invest at higher levels	Decrease allocation
Ground Transportation		X	Invest at higher levels	Decrease allocation
Government Lobbying		X[2]	Intensify lobbying initiatives	Intensify lobbying initiatives

[1]Developed by authors.
[2]Though clearly government lobbying is not a productive activity, it aims at obtaining revenue from the government. Thus, it can be viewed as a revenue generating activity, by the firm, if not by taxpayers. We treat lobbying as a late-stage activity because it typically aims at acquiring revenue through subsidies or other government favors as rapidly as possible. Though firms which seek subsidies always seek to prolong them, acquiring and maintaining an ongoing revenue stream requires ongoing lobbying.

CONCLUSION

This article provides a new synthesis between the strategic management literature and Austrian capital theory. The resource allocation process plays out in the context of differing subunit preferences, potentially resulting in tension and periodic conflict that may lead to dysfunctional relationships over time. Absent clearly understood and effective operational rules, the potential for heightened dysfunctional internal relationships will lead a conglomerate organization to have a diminished resource base for achieving its future strategic goals. This article presents a set of resource-allocation rules based on the Hayekian theory of production. By developing an effective resource-allocation paradigm based on economic theory, the organization can gain market share resulting in increased profitability and continued success in the marketplace. The Hayekian triangle offers firms an objective measure reflecting environmental shifts by tracking interest-rate changes that affect consumer and production demand. Organizations can gain "first-mover advantages" essential to provide the competitive advantage *vis-à-vis* their rivals while maintaining harmonious relationships among subunits. Entrepreneurial innovation can also be exercised by "second movers" who imitate the "first movers," perhaps taking advantage of lessons learned. This kind of innovative imitation may well provide the greatest scope for entrepreneurial activity.

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POUNDING SQUARE PEGS INTO ROUND HOLES: ANOTHER LOOK AT THE NEOCLASSICAL THEORY OF PREDATORY PRICING

WILLIAM L. ANDERSON

Austrian economists have consistently criticized modern neoclassical economics for its lack of real-world analysis, depending instead upon Friedman's contention (1953) that the strength of economic theory is its ability to predict events, period. Writes Hülsmann (1999):

> For more than forty years, economists have routinely rejected the postulate that economic theory should be realistic. Ever since Milton Friedman sketchily outlined a positive methodology for economics, most students of our science have come to endorse Friedman's view and have claimed that the only quality standard of economic reasoning was its predictive power. Good theories yield fairly correct predictions whereas bad theories yield wrong predictions. . . . Today, the utter failure of this program is patent. (p. 3)

The view that assumptions are not important in formulating economic theory has led to the intellectual disconnect in which economists carefully craft various scenarios using "rigorous" mathematical constructs, yet are reluctant to take their work seriously, since the results mean nothing unless they can be "proved" through statistical analysis. However, this problem does not keep many in the economics profession from engaging in what must be the ultimate absurdity: creating a theory that (a) cannot be ascertained from the assumptions used to create that theory, and (b) does not hold up under empirical analysis. Such is the story of the theory of predatory pricing.

The theory of predatory pricing can be likened to that strange gift from Aunt Maude or a unicorn. In the first case, one looks for an appropriate place

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to put the eccentric aunt's present, as there appears to be no place in the house where it seems to fit. As for likening predatory pricing theory to a unicorn, Yandle (1989) in his book on environmental regulation writes that a unicorn is a beast that anyone would recognize upon seeing–but the problem is that no one knowingly has laid eyes upon it. As the analogy applies to environmental regulation, Yandle writes:

> Federal air quality regulation was beginning to look more like a Unicorn. There were elaborate descriptions of details and behavior, but no one could really admit to having seen the real process in full operation. . . . Instead, those interested in environmental quality constantly pushed for more rules, as if rules alone were the goal, not improvements in the environment. (pp. 86-87)

Similar things can be said regarding predatory pricing theory. Supposedly, all of us know what it is and what is supposed to happen when a firm allegedly engages in such action. Furthermore, the Robinson-Patman Act of 1936 makes predatory pricing illegal on the federal level, and many states have their own predatory pricing laws. However, demonstrating that what one actually sees is "predatory pricing" is another matter. As Kaserman and Mayo (1995) point out:

> From an antitrust perspective, predatory pricing is a particularly difficult problem with which to deal. If we are to prevent anticompetitive monopolization, it is a strategy that must not be permitted. The paradox, however, is that such pricing is virtually indistinguishable from the very sort of aggressive competitive pricing we wish to encourage. (p. 128)

Armentano (1999) writes:

> Although the word "predation" sounds antisocial, there are important difficulties with any attempt to use antitrust policy to restrain such rivalrous behavior. In the first place, how are the regulators and the courts to distinguish truly predatory practices from the normal price reductions and exclusions that occur during any competitive market process? . . . Although there has been an extensive discussion (some would say too extensive) of some of these questions in the professional journals over the years, no clear answers have emerged. (pp. 64-65)

There is another problem with predatory pricing, however, that is just as pressing as the "unicorn" problem. Economists generally attempt to explain firm behavior by using standard neoclassical instruments. As this article demonstrates, however, the neoclassical theory of the firm, *as expressed by the use of the standard neo-Marshallian tools depicting imperfect competition*, does not grant users the intellectual apparatus by which to conclude that firms, given the assumptions of profit-maximizing behavior, would engage in an activity like predatory pricing. While one is free to theorize that firms might engage in such practices, one cannot come to that conclusion

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using the analytical tools provided by Alfred Marshall and his followers, the tools that are dominant in economics textbooks today. As the title suggests, the theory of predatory pricing is a square peg in the neoclassical round hole.

The purpose here is not to criticize predatory pricing theory itself. Numerous writers, some of whom are cited in this piece, have already done so, and even some of the theory's supporters uneasily accede to its unicorn-like characteristics, as I point out later. The purpose of this paper is much more narrow in that it deals with the assumptions of predatory pricing and the neoclassical models used to demonstrate the actions of firms that operate in the state of "imperfect competition." If one uses these models to examine the patterns of firm behavior, one cannot also use these models to "prove" predatory pricing.

The Theory

The theory of predatory pricing, which falls into a subset of the category of price discrimination, is relatively simple. It is a practice that allegedly causes "primary-line injury" by attempting to put competitors out of business, according to Shughart (1990). Its essence is explained by Kaserman and Mayo (1995):

> Predatory pricing is said to occur when a firm with some significant monopoly power reduces its price below the short-run profit maximizing (or loss minimizing) level in order to drive its competitors from the market so that, following their exit, price can be raised above the level that could otherwise be sustained. In essence, the strategy represents an investment in current losses that is expected to pay dividends in future monopoly profits. By charging prices that are sufficiently low to inflict losses on rival firms, the predator effectively purchases a market structure that is more conducive to monopoly pricing. It is, then, a strategy specifically designed to monopolize a market. (p. 128)

In other words, as Shughart explains, "A firm charges different prices to different customers in the attempt to destroy a rival seller" (p. 295). This differs from the standard neo-classical view of price discrimination in which a firm is able to segment its markets based upon the elasticity of demand of the consumers in each market. In that case, the firm sets output in each market where marginal cost equals marginal revenue, thus enabling it to maximize profits in a way that could not occur if the firm sold all its goods at one single price. In the case of predatory pricing, the offending firm allegedly sets price and output at levels where price is less than marginal cost.

While I have quoted skeptics, I also note that some economists have openly supported predatory pricing laws on theoretical grounds. Areeda and Turner (1975) argue that while actual predatory pricing might be difficult to

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detect, it should be deemed illegal. Furthermore, they say that a firm that sets its price below average variable costs for the *purpose of driving rivals out of the market*, should be regarded as acting unlawfully. Williamson (1977) argues that if a dominant firm increases its output as a response to entry by another firm, then the government should view its actions as predatory, since the effect of increasing output will be to drive down prices. He proposed that if a firm lowers prices, then gains monopoly power through that action, then it should be prohibited from expanding its own output in the aftermath.

Baumol (1979) writes that predatory pricing can be a successful strategy *only* if the firm engaging in that practice is able to *raise* prices after its actions have helped it gain monopoly power. Thus, he writes, a firm will be free to lower prices, but it would be illegal to raise them again—unless the government permitted it under certain circumstances.

Even these policy recommendations, however, come because the traditional way of "detecting" predatory pricing—setting prices below marginal cost—can be difficult. In fact, Areeda and Turner (1975) argue that their below average variable cost-pricing model permits easier detection of illegal predatory pricing.

Scherer (1976) criticizes Areeda and Turner, writing, "it is unrealistic and even analytically wrong to apply a simple short-run price-cost rule for determining whether exclusionary pricing by a monopolist is socially undesirable and therefore predatory" (p. 890). He concludes that one cannot "substitute simple cost rules" for the kind of thorough analysis that is needed to see whether or not the episode of alleged predatory pricing actually has created social harm. Areeda and Turner (1976) reply that the kind of analysis that Scherer recommends is so complicated that a simple cost test proves to be an adequate proxy.

(From an Austrian point of view, all of these cost-based analyses are deficient for the simple reason that costs are subjective, not objective. Therefore, any attempt to determine whether a firm is pricing below "explicit" costs—if such a thing can be proved—is an exercise in nonsense, since the costs to firm owners that are relevant are the subjective or implicit costs, which can never be determined by accountants and certainly not in the courts.)

Taking an empirical view, Koller (1971) writes that predation can be used as a tool to discourage entry or force collusion (or a merger) between the predator and the "victim." Burns (1986) examined price-cutting tactics of the American Tobacco Company near the turn of the twentieth century, finding that the firm's actions substantially lowered its costs of acquiring other firms by forcing down the value of their assets.

According to the Sherman Antitrust Act of 1890, it is illegal for firms to engage in practices that would enable them to monopolize a market. Thus, the theory of predatory pricing creates interest not only for its theoretical content, but also because alleged behavior of this type can be construed to be illegal. Because of this, lawyers, business firms and governmental entities that successfully sue competitors, as well as politicians, stand to benefit from

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legal application of predatory pricing theory, argues DiLorenzo (1992). He writes that while he believes predatory pricing theory is a "myth," it survives because of four reasons:

> First, huge sums of money are involved in predatory pricing litigation, which guarantees that the antitrust bar will always be fond of the theory of predatory pricing.
>
> Second . . . the idea of predatory pricing lends itself to political demagoguery. . . . Protectionist members of Congress frequently invoke that myth in attempts to protect businesses in their districts from foreign competition.
>
> Third, ideological anti-business pressure groups . . . also employ the predatory pricing tale in their efforts to discredit capitalism and promote greater governmental control of industry.
>
> Fourth, predatory pricing is a convenient weapon for businesses that do not want to match their competitors' price cutting. (p. 2)

In other words, predatory pricing theory persists because well-placed individuals and organizations that benefit from accusing others of engaging in predatory pricing will use their resources to keep the theory alive.[1] Some economists (including those who make tidy sums of money by testifying in antitrust cases or who are employed by law firms that promote such litigation) hold to predatory pricing theory, but, argues DiLorenzo, "Their support for the notion is based entirely on highly stylized 'models', not on actual experience" (p. 3).

As noted earlier, Kaserman and Mayo are not altogether comfortable with predatory pricing theory, and they are hardly alone. Shughart writes that if one examines the actions and risks firms must undertake in order to engage in illegal predation, it "does not pay" (1990, p. 296). McGee (1958) writes that predatory pricing cannot be thought of as a rational business strategy because the "predatory" firm in the end is likely to suffer greater losses than its rivals. Other economists, including Stigler (1967) and Telser (1966) have attacked such a strategy because it conflicts with the assumption of rational behavior by firm owners. Isaac and Smith (1985) examined a number of predatory pricing cases and concluded that they were unable to ascertain whether or not the firms accused actually had engaged in such practices.

The strongest Austrian criticism of the theory of predatory pricing comes from Armentano (1999). Rothbard (1993, 1970) denounces antitrust laws in general, as well as predatory pricing theory.

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[1]Perhaps it is instructive to note that most of the literature on predatory pricing outside textbooks can be found either in law journals or journals that concentrate upon economics and the law.

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It is not my purpose to rehash these criticisms of predatory pricing theory. Economists have been successful both in *a priori* and a *posteriori* analysis in demonstrating that this is a dubious theory of economics and should be regarded with much suspicion. Instead, I would like to go a step further and demonstrate why I believe that the standard neoclassical theory of the firm as commonly depicted in economics textbooks and the theory of predatory pricing are mutually exclusive.

Neoclassical Analysis and Theory of the Firm—Another Look

The standard tools of neoclassical analysis are basically static in character. That is hardly news, and most economists employing these tools are comfortable with accepting their static nature—and their limitations. Yet, these models not only are limited because of being static, but also because of their assumptions, which ultimately are the key to the downfall of predatory pricing theory within a neoclassical framework.[2]

Although much of the economics profession stands by the Friedman (1953) hypothesis that assumptions are not important in the formation of economic theory, it certainly is not the case when it comes to presenting the neclassical theory of the firm, including perfect and imperfect competition.

The first and most important assumption is that firms maximize profits, with each firm setting output where marginal cost equals marginal revenue. A firm operating within a regime of perfect competition faces a market price over which it has no control, as the market independently sets the price.[3] Thus, a firm in perfect competition loses *all* sales if it chooses to charge customers above the market price, while setting one's price *below* the market price is an act of foolishness, given that such an action will have no effect upon its own sales and those of its competitors. Predatory pricing, therefore, cannot exist within a regime of perfect competition, nor does anyone claim that it does.

Theories of imperfect competition still depend upon the profit-maximizing assumption even though a firm operating in the arena of imperfect competition faces a downward sloping demand curve and, thus, has an element of monopoly power. However, as in the case of the firm in perfect competition, the primary issue that the firm faces is where it should set output

[2]This is not to say that one cannot construct a model in which a firm looks at the present value of monopoly profits that could be gained through successful predatory pricing. However, such a model is dynamic, while here we deal with static neoclassical models. Furthermore, even if one were to create such a dynamic model, there is still the sticky situation of assumptions that accompany the neoclassical theory of the firm.

[3]This is not to discount that other theories of the firm exist. Baumol (1967) presents a theory in which a firm is a revenue maximizer instead of a profit maximizer. However, Baumol's model is not widely accepted by mainstream economists who continue to rely on the profit-maximizing model of the firm.

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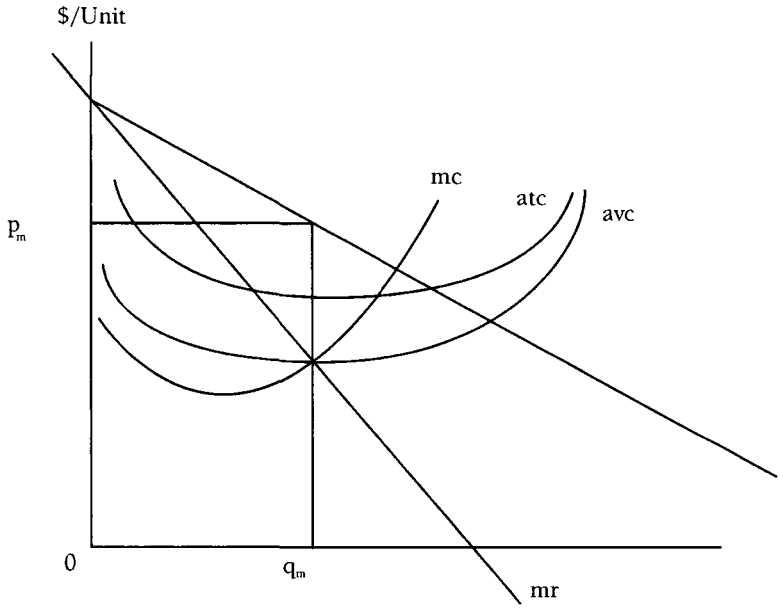
(where marginal cost equals marginal revenue), which then determines what price consumers will be charged. This is shown in the following diagrams.

Figures 1-3 tell the story using standard neoclassical theory of the firm graphs. The firm in Figure 1 is a standard firm operating within imperfect competition that maximizes profits, setting output at q_m and price at p_m.

Figure 1



Since one firm faces a downward sloping demand curve, it is safe to assume here that the other firms in the industry also face downward demand curves. However, it also could be a *dominant firm* with the rest of the industry being what is called the "competitive fringe," a model that Kaserman and Mayo (1995) write "has a long history in the economics literature." (The dominant firm-competitive fringe model requires a different graph, one that is not reproduced, since it does not change the outcome of this discussion.)

In a dominant firm-competitive fringe setting, one producer, while not being the only supplier, dominates production relative to other firms in the industry. Alchian and Allen (1983), for example, write that a better description of the Organization of Petroleum Exporting Countries (OPEC) is not as a cartel, which is the common view of OPEC, but rather as a dominant firm-competitive fringe industry, with Saudi Arabia being the "dominant firm."[4]

[4]Alchian and Allen (1983) point out that when the OPEC ministers agree to cut oil supplies, the only entity that actually cuts production is Saudi Arabia. Thus, they write, it

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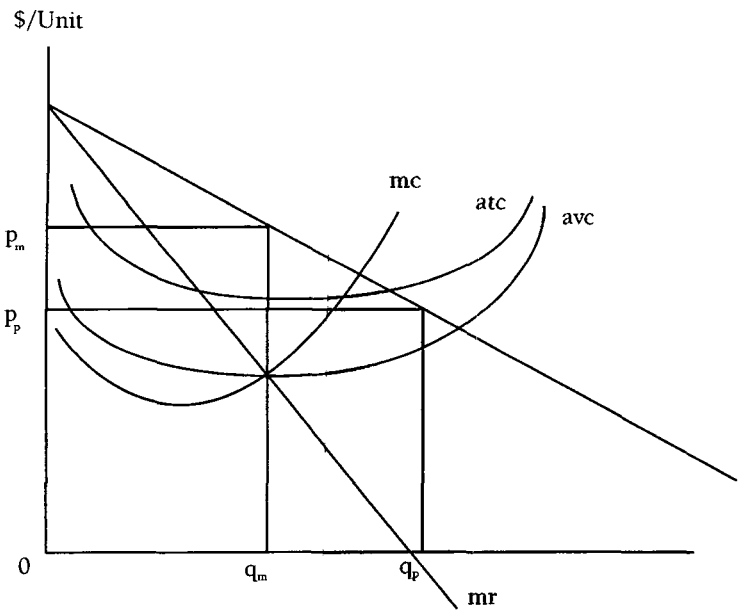
Alchian and Allen write that such a firm generally finds it advantageous to sell its product for less than what might be profit maximizing for the competitive fringe. This practice, however, cannot be labeled predatory pricing since the lower price and output that is set by the dominant firm is *profit maximizing* to that firm. While the lower price might hurt the profitability of the fringe firms, it does not hurt the dominant company, which places such a practice outside the assumptions needed for predatory pricing theory to be applied.

In Figure 2, the firm that seeks to engage in predatory pricing lowers its prices to below marginal cost and average total costs.[5] Here, we see output set at q_p and price at p_p. The placing of price and output is arbitrary here. While output is set approximately at revenue maximizing levels [mr = 0] this is not done as part of a deliberate strategy. I have chosen to set price below average total costs and marginal costs, but not average variable costs, the Areeda and Turner standard.

Figure 2



In Figure 2, I assume that the price set by the "predatory" firm is low enough to drive other firms out of business. Of course, since the "predatory" company is not setting price below its average variable costs, one must then

is in the interest of the fringe members of OPEC to have Saudi Arabia producing at a lower output than what is an amount that maximizes Saudi Arabia's profits (p. 267).

[5]Defining predatory pricing as charging below average costs is in line with Areeda and Turner (1975), who attempt to lay out groundwork for defining what would constitute "illegal" predatory pricing and what would not.

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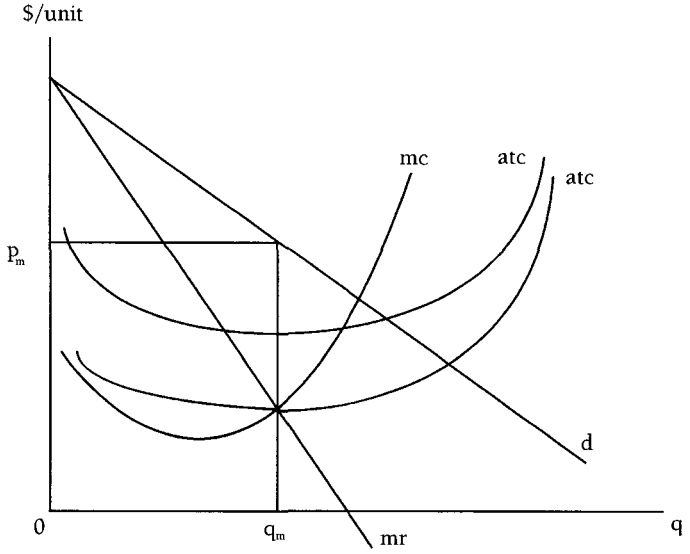
also assume that this firm has a lower cost structure than the other firms in the industry.

Figure 3, assuming the firm has driven out all of its weaker competitors, demonstrates a firm that now faces a steeper demand curve and once again is setting monopoly output and price, P_m and Q_m.[6] Since the successful firm has become a *bona fide* monopoly (I admit this is an unlikely occurrence, but I do it for the sake of argument), I list demand and output in capital letters, signifying that the firm has now captured the entire market. Even if the "predatory" firm has not driven out all of its competitors, one would assume that successful predatory pricing would mean that the firm in question has been able to take a leading role within the industry, perhaps even becoming a "dominant firm" in the manner of what was discussed earlier in the dominant firm-competitive fringe model.

Figure 3



Whatever the new configuration of the industry following a firm's successful attempt to engage in predatory pricing, there are some things that logically follow. First, other firms that might have survived the ordeal of having been put through a period of strong cost cutting will not be in a position to successfully challenge the dominant firm in the industry. Surviving firms are likely to be part of a competitive fringe in which the smaller companies have

[6]There are many assumptions in these figures, as will be discussed throughout this paper. While I have found no text or paper that actually assumes the firm will face a steeper demand curve, during a personal exchange in 1999 with Kenneth Elzinga of the University of Virginia, who is recognized as one of the nation's leading antitrust economists, he said that is the assumption. Another possibility is that the new demand curve faced by the predatory firm will both shift to the right and also be steeper. How much it would shift and how much steeper it would become are simply guesses.

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higher cost structures than the dominant one. Furthermore, within a dominant firm-competitive fringe structure, the profit-maximizing price for the dominant firm is less than that of the competitive fringe. Third, the surviving firm indeed could be a monopoly with no competitors, the one I have chosen to depict in Figure 3.

(I have also taken the liberty to assume that input prices would be lower, since the dominant firm's competitors have been driven from the market. Thus, all cost curves have shifted to the right as opposed to the firm in Figures 1 and 2. More analysis of these figures will be given later in this paper.)

Although it is impossible to determine from the figures themselves (one of the difficulties of "proving" predatory pricing using neoclassical tools—which is the central subject here), ostensibly the firm in Figure 3 is enjoying greater monopoly profits than it would have had it simply gone with monopoly price and output as is depicted in Figure 1.

Figure 1 demonstrates how the theory works. The firm sets output at q_m and price at p_m, which is the point of profit maximization for the firm (mc = mr). In this model, one can argue—as do many economists—that the firm is gaining a "monopoly price" over a "competitive price" in which the firm sets output where marginal cost equals demand.[7]

However, the firm in this example wishes to drive out competitors, so it elects to set output and price below average total costs (as shown in Figure 2). This, I admit, is an arbitrary placement, but since Kaserman and Mayo (1995) note that economists are not united in determining what actually constitutes a "predatory" price, I have chosen a price that would impose losses on the firm, as opposed to a "shutdown" price of something less than average variable costs, which Areeda and Turner argue should also be deemed an illegal price. Assuming this strategy is successful, the firm that engages in predation will then drive out competitors and become a monopoly.

Figure 3 shows the firm that has successfully pursued the strategy and now enjoys monopoly status. (I assume that other firms either were not able to match the price and stay in business, or simply chose not to do so and stopped production altogether.) Because other competitors are gone, we can assume (as I noted earlier) that the monopoly faces a less elastic (steeper) demand curve than it faced when other firms were in the industry. At the same time, assuming an increasing cost industry, a lack of competitors would also mean that factor prices most likely would be driven down, which is why the cost curves have shifted to the right from their original positions in Figures 1 and 2.

While this may seem to be a valid approach to analyzing predatory pricing, there are a number of problems that must be discussed. First, if this is a

[7]Rothbard (1993) challenges the dichotomy between monopoly prices and competitive prices in *Man, Economy, and State*, writing that if the firm is operating in a free market, no matter the number of firms in a particular industry, then there is only a free-market price (pp. 565-73).

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correct scenario, one cannot claim harm to consumers at any point of the process, since the entire operation has resulted in lower prices. The only way that it would be possible for consumer prices to rise above where they were in Figure 1 would be for the predatory firm's costs to remain the same while the demand curve it faces has become steeper, or if the fall in factor prices had less effect than the change in demand that the new monopoly would face.

This assumption is based upon the premise that factor prices in this particular industry are impervious to demand, which can only be true in a constant cost industry. In the case of an increasing cost industry, however, if other competitors are eliminated and the predatory firm is not able to expand its operations to bring its production to previous industry levels, then it stands to reason that factor prices will fall.

As one can see in comparing Figures 1 and 3, prices for the product made by this mystery company are less after the firm has gained monopoly status. Furthermore, consumers were able to enjoy lower prices during the period when the predatory firm was engaging in its bout of "cutthroat" competition, but will still demand the product even after the monopoly firm drastically raises prices.

Another point to make is that one cannot determine whether or not the profits enjoyed by the firm in Figure 3 are higher than the profits the firm was earning in Figure 1. In other words, we cannot determine *a priori*, given the assumptions of the model, if the firm's profits earned after it has eliminated its competition are more than its profits when it was in an industry in which there was at least some competition between the member firms.

Furthermore, as Figure 2 demonstrates, in order to successfully lower its price, the "predatory" firm must increase output, because to simply lower its prices would cause a run on its products. Since the firm does not (at this time) have the entire market, one cannot call it a "market shortage," yet the same effects would occur when a firm sets its price below the market price but does not increase its output. If the predatory firm sells out of its inventory, customers might well be willing to shop elsewhere even if prices are higher, since products there would be more available. Since the theory holds that the firm that faces a downward sloping demand is "holding back" on its production in order to enjoy "monopoly" profits, one can assume that the predatory company has increased its output in order to force down prices.

It might be possible to construct graphical models in a way that demonstrates that the firm that successfully drives out its competitors through predatory pricing will also be earning more profits afterward. For example, Areeda and Turner do so in their 1975 piece. However, it is important to note that such a construction would be *no less arbitrary* than the figures that I have presented in Figures 1-3. Moreover, whoever constructs such models also must contend with the changes in the cost structures that occur if some firms within an industry are driven out of business. When these changes are taken into consideration, it becomes impossible to construct a logically consistent

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predatory pricing model that squares with the assumptions of the neoclassical model of the firm in imperfect competition.

Another problem with using the neoclassical viewpoint here to predict predatory pricing is that the firm in Figure 1 is already at an equilibrium point *from which there is no incentive to move.* Although economists are fond of saying that the price the firm receives and its output levels at mc = mr are not "efficient," as far as the owners of the firm are concerned, there are no more gains from trade, which is the true measure of "efficiency." Once one party in an exchange sees no more gains from trade, the trading stops. This last point is something that seems to have eluded those economists who insist that "market efficiency" exists only where price equals marginal cost.

The exception, of course, is found in third-degree price discrimination in which a firm is able to successfully segment its markets so that it can set price and output where marginal costs meet marginal revenue *in each market.* In order for price discrimination to be successful, however, the firm must devise methods to keep buyers from exploiting gains from trade by purchasing the particular good in its less expensive market and reselling in the higher priced one. Not all situations fulfill the conditions for price discrimination, and even if the "predatory" firm, after successfully engaging in predatory pricing, does practice price discrimination, it does not change the outcome of my analysis. Furthermore, while some markets feature more elastic demand than others, trading stops where marginal cost equals marginal revenue, which is still labeled a "monopoly" price.

To say that a firm will jump from a profit maximizing position as seen in Figure 1 and engage in predatory pricing, an action that is potentially ruinous to that firm, is to be making a rather heroic assumption. As pointed out earlier, given the assumptions of the model, the profit-maximizing firm is not free necessarily to charge higher prices, since its actions are limited to looking for the profit maximizing output and price. Even if the firm did manage to drive out all other competition through predatory pricing, that does not mean the firm will be raising prices, Figure 3 demonstrating that, indeed, prices theoretically could be *lower* after the successful predation has taken place. This solution–and it is plausible, given the assumptions of the model–clearly does not demonstrate that predatory pricing need be a menace to consumers.[8]

While economists have not expressed these difficulties with explaining predatory pricing through neoclassical theory of the firm tools, it is clear that they are not comfortable using them, at least if one examines the texts. In examining both general economics textbooks and texts on industrial organization, I have found that the authors generally go outside the typical models

[8]The common objection to alleged predatory pricing is that it is believed that once a firm has driven out the competition, it is free to set prices wherever it wishes.

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when they explain the theory of predatory pricing, either using verbal explanations or using game theory models.[9] This is no oversight on their part.

For example, Shy uses both graphs and mathematics extensively when working through his text on industrial organization *except* when he articulates the theory of predatory pricing. At that point, he is satisfied to explain the theory in a few paragraphs–and nothing else (Shy 1995, pp. 89, 212). Kaserman and Mayo almost do likewise. They use the theory provided by Areeda and Turner, and even that one uses only cost curves and is very limited and selective in its instruction, and they construct a model like my Figure 2, except the firm in their model does not increase its output, which also creates logistical problems of its own.

Although Nicholson's text makes extensive use of mathematics and graphs, nothing like that appears in his section on predatory pricing, which consists only of two written paragraphs and no diagrams or mathematical equations. In fact, my own search to see how economists fit predatory pricing into the standard neoclassical models turned up nothing. That should not be surprising, given the difficulties of matching the models to the theory as I have already pointed out.

Predatory Pricing and Contestable Markets

Although mainstream neoclassical economists have alluded to predatory pricing as a viable business strategy, as noted earlier, they are also uneasy about whether or not it is legitimate in practice. I have already mentioned the criticisms from Shughart and Kaserman and Mayo. Baumol, Panzar, and Willig (1982) lay out in their theory of "contestable markets" that certain entry conditions within an industry would make predatory pricing a self-defeating strategy, but only if those particular assumptions are met.

The contestable markets theory, while interesting, depends upon relatively costless entry into a market, which is one of the assumptions for perfect competition. The theory states that if entry into an industry is relatively *costless*, no matter what might be the configuration of that industry, firms will quickly enter the market as soon as the possibility for economic profits within that industry arises. When applied to predatory pricing theory, one can see that in an industry characterized by contestable markets, such a strategy would be self-defeating, since the "predatory" firm would not be free to try to earn monopoly profits once it had driven its competitors out of business.

The prime example has been the airline industry, because it is believed that the geographical movement of capital–mainly airliners–is seen as being relatively easy. In fact, as noted by Baumol and Bailey (1984), the perceived

[9]Books include Nicholson (1995), Shughart (1990), Shy (1995), Kaserman and Mayo (1995), Hay and Morris (1991), and Hirshleifer (1980).

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mobility of airline capital was one of the justifications for airline deregulation in 1978.

But while it has sparked much discussion, the theory of contestable markets also has its critics. Shepherd (1984) writes that the theory does not adequately explain real-world events. Kaserman and Mayo point out that the rigid and highly stylized zero-cost assumption precludes most industries. Thus, while the theory does provide one antidote to predatory pricing theory, it does not provide a standard by which the profession looks at the efficacy of predatory pricing. Furthermore, there is little that sets contestable markets theory apart from the theory of perfect competition, and this article has already pointed out that predatory pricing is a theory of *imperfect competition*, not perfect competition.

Does it Matter?

Neoclassical economists, at least since Friedman articulated his views on methodology in 1953, have held that assumptions do not matter for economic theory as long as the theory that is constructed is relatively accurate in predicting events. All one needs to do is to articulate a theory, collect appropriate data, and then test it through statistical means. If the statistics are significant, it means that one, albeit on somewhat shaky ground, can accept the theory to be true, at least in this particular case.

Austrian economists have countered that such an approach is inappropriate in its applications to economics. Rothbard (1993) writes that the constant statistical testing of hypotheses, while necessary for disciplines like the natural sciences, does not make sense when it comes to economics. If a law of economics cannot be universal, then it cannot be a law.[10]

For example, either the law of demand holds in all cases, or it does not hold, period. One does not "test" it in order to see if it is valid. Furthermore, as Rothbard points out, we derive the law of demand, as well as other laws of economics, from the simple yet profoundly empirical premise that individuals act purposefully (p. 1).

Economists have interpreted the neoclassical theory of the firm both from *a priori* and *a posteriori* positions. First, by dividing competition into categories of perfect (the firm faces a horizontal demand curve) and imperfect (the firm faces a downward sloping demand curve), the economist makes implicit assumptions about the firm's behavior depending upon what category into which the firm falls. Second, mainstream economists generally

[10]Austrian economists, as well as many mainstream economists, objected to Card and Krueger's (1994) paper that, in effect, said that the law of demand does not hold for the fast-food industry in New Jersey and Pennsylvania. The objection was based upon an *a priori* assumption that when the price of something increases, *ceteris paribus*, the amount demanded decreases.

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agree that perfect competition is preferable to imperfect competition, since the firm in perfect competition operates at its most "efficient" level–even if they hold that conditions of perfect competition are almost impossible to create.

Furthermore, the very definition of "market failure" is that a firm faces a downward-sloping demand curve. Another way to put it is that were a firm to raise the price of its product even by one-millionth of a cent, and if it did not lose all sales immediately, then "market failure" has occurred.[11] This is an *a priori* determination, which means that economists can declare a "market failure" based upon the assumptions of the model.

It is also assumed, based upon the premise of firms being "profit maximizers," that the firm will always set output where marginal cost equals marginal revenue. In imperfect competition, this means that the firm will be able to receive a monopoly price for its product. Again, this determination is made *a priori.*

On the other hand, economists note that the assumptions that preclude a definition of a firm being in perfect competition are unrealistic. However, while Austrians like Rothbard (1993) and Kirzner (1979) have written that the unreality of the assumptions render the condition of perfect competition useless in examining economic behavior, mainstream economists, including Friedman (1953) and Sowell (1981), write that while the assumptions of perfect competition may be unreal, the theory nevertheless is valid because it gives an accurate portrayal of the behavior of firms.

The point here is not to rehash the Austrian versus neoclassical debate on *a priori* and *a posteriori*, but rather to demonstrate that mainstream economic theory of the firm does, in fact, depend upon the assumptions. Furthermore, as I have already pointed out, in the case of predatory pricing, one cannot use the neoclassical assumptions and the models created from those assumptions to make a case for that particular theory.

Is Criticism of Predatory Pricing Theory Attacking a Straw Man?

As noted previously, there are many critics of predatory pricing theory within the neo-classical camp. Furthermore, even the advocates of legal action against firms found guilty of "predatory pricing" admit that it is very difficult to distinguish that practice from the kind of aggressive pricing that is part of the competitive world of business.

However, none of the neoclassical critics have come out and noted that the assumptions of their models do not permit predatory pricing in the first place. While they express skepticism in their textbooks and papers on the

[11]How one deals with "market failure" is a matter of opinion. Some economists, notably McCormick and Tollison (1981) write that there may not be any viable "solution," while other economists, including Samuelson, write that "market failure" can only be corrected by government action.

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subject, that does not stop them from presenting the models not only as viable economic theory, but also as a theory with public-policy implications.

The problem is that when they present the theory, they must go outside the boundaries they have drawn for laying out the theoretical framework for the firm. If they could use their graphical and analytical models of imperfect competition to describe predatory pricing, they would do so. That they do not is telling evidence that the theory is logically inconsistent when one applies the assumptions of the model. Moreover, even when they do give a verbal explanation of predatory pricing theory, they still do not point out why such a plan of action should be made illegal.

As noted earlier, Friedman gives economists an "out" in a case like this: when one's theory is in difficulty, the assumptions suddenly do not matter. However, antitrust advocates already have committed themselves to a regime in which the assumptions do matter, and they matter greatly. Therefore, if they are to make a legal case against predatory pricing, they must be able to present a credible theory that squares with the assumptions of their models. So far, they have not done so.

Economists have every right to be skeptical about the theory of predatory pricing. Advocates of contestable market theory even point out that if the assumptions of costless entry are met within certain industries, then predatory pricing is unlikely to occur, but only under those highly stylized conditions. The issue I have presented here, however, is not one of professional skepticism, but rather, whether or not the theory is viable at all, given the assumptions contained in the models for theory of the firm.

Conclusion

I have demonstrated the difficulties of explaining the theory of predatory pricing using the neoclassical theory of the firm. In fact, to paraphrase Bork (1978) in his criticisms of antitrust law, predatory pricing is a theory "at war with itself." Economists who insist on giving credence to such a theory find that they must go "outside the box" in order to adequately explain their points.

However, the law of noncontradiction demands that one either stay "inside" or "outside" the neoclassical theory of the firm. One is not intellectually free to use the theory at one time to explain economic action, and to discard it at another. If the theory of the firm does not apply in all explanations of firm behavior, then it cannot apply at all. If economists cannot explain the theory of predatory pricing consistently with their models *a priori*, and if they are unable to conclusively observe *a posteriori* that successful predatory pricing has, indeed, occurred, then perhaps it is time to cast this particular theory onto the ash heap of intellectual history.

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THE MODERN THEORY OF CONSUMER BEHAVIOR: ORDINAL OR CARDINAL?

WILLIAM BARNETT II

The modern approach to consumer behavior, indifference curve analysis (ICA), is based, in theory, upon "revealed preference." In actual practice, each (different) indifference curve is the locus of points generated by setting the differential of a utility function equal to a (different) constant. Neoclassical economists maintain that indifference curves, utility and the utility functions from which they are derived, are ordinal, not cardinal, in nature. They also maintain that utility cannot be measured cardinally. That is, an individual can only prefer A to B or be indifferent between them;[1] he cannot measure how much he prefers A over B. They also maintain that interpersonal utility comparisons are logically invalid.[2] Indeed, the history of economic thought bears eloquent witness to the fact that the concept of ordinal utility triumphed over cardinal utility.

WILLIAM BARNETT II is associate professor of economics at Loyola University New Orleans. The author wishes to thank my colleague Walter Block and two anonymous referees of this journal for careful, meticulous and incisive comments on an earlier version of this article. Thanks to their efforts, this article has been deepened, broadened, and reorganized. Although the paper has been vastly improved through their exertions, the author is still responsible for all remaining errors and infelicities.

[1]An important dispute concerns indifference. Austrians (Rothbard 1997, pp. 225-27; and, Block 1980, 1999) hold that an individual cannot, in an economically meaningful way, be indifferent between two bundles of goods, whereas non-Austrians (Caplan 1999; Nozick 1977) maintain they can.

[2]That, as a matter of economics, such comparisons are nonscientific does not obviate the necessity of courts to make them every day. Moreover, in attempting to make such comparisons as scientific as possible for this purpose, courts, *inter alia*, allow "experts'," including economists', testimony into the record upon which triers-of-fact may base their decisions on the quantum of damages. Of course, because the whole process is so subjective it is not uncommon for appellate courts to force the quantum to be revised. For more on this see, Block (1980, 1999).

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Austrian economists also maintain that utility is ordinal. However, they challenge the use of mathematical utility functions by neoclassical economists on the grounds that such functions yield cardinal utilities, "measured," usually, in utils.[3] Neoclassicals respond by asserting that, in dealing with bundles of goods: (1) a function that ranks bundles in accordance with an individual's necessarily ordinal preference ranking is an ordinal function, and the ranking it generates is ordinal; (2) because the ranking of bundles generated by a specific utility function (F) remains the same after any positive monotonic transformation into another function (G), G, also, is a utility function; and, (3) in that case, it does not make any difference whether an individual's preferences are represented by F, by G, or by any other function that is a positive monotonic transformation of F (or of G for that matter).[4]

However, maintaining that "properly constructed" utility functions are valid representations of, admittedly, necessarily ordinal utility is very misleading, and confuses and obfuscates the issue, because as these functions are to be the objects of calculus operations they necessarily require cardinal numbers.[5] Thus, the use of such functions necessarily implies that we are simultaneously in the realms of cardinal *and* ordinal utility,[6] which is problematical, at best. The problem originates in their interpretation of utility functions as ordinal and not cardinal. It is compounded by two other factors: the assumption that utility functions are differentiable; and the failure to use, correctly and consistently, dimensions in their work with utility functions. It is my contention that their analysis is incorrect, both as a matter of praxeology and as a matter of mathematics.

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[3]On the confusing use of "utils" and other cardinal units of measure of utility or happiness by economists who acknowledge that utility or happiness is ordinal, see the appendix, below.

[4]On the issues in this paragraph, see Rothbard (1993, pp. 67-108, 1997, pp. 211-54); High and Bloch (1989, pp. 351-65); Gordon (1992, pp. 99-112); McCulloch (1977); and White (1995).

[5]Austrians do not object to the idea of utility functions, *per se*; i.e., they have no objection to truly ordinal utility functions. Rather, they find objectionable the *de facto*-cardinal neoclassical utility functions, and the uses made thereof.

[6]An anonymous referee comments that,

> It was the use of indifference curves by the victorious neoclassicists that permitted them to have ordinal utility and mathematical functions too. Indifference curves, invented by Edgeworth in the 1880s, made no advance among economists until it was noticed that they made it appear that one could advocate ordinal utility while doing mathematics.

I regard this statement as complementary to my own view, and thank him for it.

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The purpose of this article is to demonstrate that neoclassical utility functions[7] are an invalid means of analyzing consumer behavior for three reasons: first, and most important, because such functions, and their attendant rankings, are cardinal, not ordinal in nature; second, because, with respect to the set of bundles relevant to actual human beings, such functions are not continuous and therefore, not differentiable; and, third, such functions do not correctly, consistently, and properly include dimensions/units.

In the next section, I identify the two central elements of the neoclassical position on utility functions, using the views of Samuelson (1965) on this matter; in the sections "Utility Functions Constructed" and "Differentiability and Continuity," I consider each of these elements in turn; in the section "Dimensions," I analyze this issue from the very neglected aspect of dimensions; the final section contains my conclusions.

Central Elements of Neoclassical Utility Theory

Consider the following from Nobel Laureate Paul A. Samuelson (1965, pp. 93-95).

> By the end of the nineteenth century many writers, notably Pareto, had come to the realization that it was an unnecessary and unwarranted assumption that there even exist utility as a *cardinal* magnitude. Since only more or less comparisons are needed for consumer's behavior and not comparisons of how much more or less, it is only necessary that there exist an *ordinal* preference field. For any two combinations of goods $(x_1^0,...,x_n^0)$ and $(x_1^1,...,x_n^1)$, or for brevity (X^0) and (X^1), it is necessary only that the consumer be able to place them in one of the following mutually exclusive categories.
>
> a. (X^0) preferred to (X^1)
>
> b. (X^1) preferred to (X^0)
>
> c. (X^0) and (X^1) equally preferred or indifferent.

---

[7]An anonymous referee argues that

> The cardinalists . . . claimed that ordinal ranking of bundles could result in either preference or indifference. (The latter) permitted mathematical functions to be used since indifference means equal utility and thus, implies cardinal numbers. Rothbard's (1997, pp. 225-27) response to this is to claim that indifference cannot be the basis for action, only preference can, and therefore, that the assumption of indifference is a psychological, not a praxeological, one.

I do not disagree with this. Very much to the contrary. However, it does not seem likely that the neoclassicals will ever abandon indifference. Therefore, this article is an

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For convenience, we may attach a number to each combination; this is assumed to be a continuous differentiable function. This function, or rule of numbering, may be written:

$$\varphi = \varphi(X) = \varphi(x_1, \ldots, x_n).$$

It is so constructed that the following three conditions correspond to the above three respectively:

$$a' \quad \varphi(X^1) < \varphi(X^0)$$

$$b' \quad \varphi(X^0) < \varphi(X^1)$$

$$c' \quad \varphi(X^0) = \varphi(X^1)$$

φ may be designated as a utility index[8] [footnote added]. The one-parameter family of loci defined by

$$\varphi(x_1, \ldots, x_n) = C,$$

where C is regarded as a parameter, are designated as indifference loci.

It is clear that any function

$$U = F(\varphi), \; F'(\varphi) > 0$$

defined by any monotonic transformation of φ, is also a utility index. For

$$\varphi(X^1) \gtrless \varphi(X^0) \text{ implies } U(X^1) \gtrless U(X^0), \text{ respectively.}$$

The converse also holds. Thus, from any one utility index all others can be derived by a suitable functional transformation.

To summarize, our ordinal preference field may be written

$$U = F(\varphi(X^1) \gtrless \varphi(x_1, \ldots, x_n)), \; F'(\varphi) > 0,$$

where φ is any one cardinal index of utility.

---

attempt to confute utility functions, not by rejecting indifference, but, rather, on other grounds.

[8]A more modern, but essentially no different, definition is: u: X $\rightarrow$R is a utility function representing preference relation $\succsim$ if, for all x, y $\in$ X, x $\succsim$ y $\Leftrightarrow$ u(x) $\geq$ u(y), where R is the set of real numbers, X is a set of bundles of goods, and x $\succsim$ y means that the individual values x at least as much as y. See Mas-Colell, Whinston, and Green (1995, p. 9).

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> It is clear that the choice of any one numbering system or utility index is arbitrary. The indifference loci are left unchanged by any alteration of the tags attached to each, providing ordinal relationships are maitained.

Let us be quite clear. Neoclassical economists wish to apply calculus to utility functions; i.e., they wish to take their derivatives. In fact, that is the sole purpose for restating preference rankings in the mathematical language of functions. However, for calculus to be applied to these functions it is necessary that the numbers assigned be cardinal.

In order to achieve their purpose, two basic elements, one developed and one assumed, are established, each of which is essential to the claim that, if properly constructed, utility functions can be ordinal *and* grist for the mill of calculus. They are:

(1) that a (utility) function can be constructed that assigns *cardinal* numbers to bundles of goods such that the ranking of the bundles in accordance with these numbers is identical to an individual's preference ranking of the same bundles, and, moreover, such a function and its attendant ranking of bundles are *ordinal* in nature; and,

(2) that such functions are differentiable.

But there are grave problems with this analysis. I examine each of these elements of the neoclassical approach in turn.

Utility Functions Constructed

That a utility function can be constructed that would order bundles of goods consistently with an individual's preference ranking of those bundles is undisputed. The real issues are other.

(1) What is the relationship between such utility functions and actual preferences?
(2) Are such functions and the orderings arising therefrom ordinal or cardinal in nature and how do ordinal preference rankings arise from cardinal preference rankings?
(3) What is the relationship between the nature and the purpose of such functions?
(4) Do results derived from mathematical operations on such functions apply, as well, to the individual's preference rankings that these functions represent?

Ontologically, #1 is probably the most important issue, with #4 second. However, mathematically, and for the purposes of the present article, #2 is the most important, with #3 of lesser importance.

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The Relationship between such Utility Functions and Actual Preferences

First, neoclassical economists (Frank 1991, p. 90) maintain that utility functions "represent" preference relationships. Moreover, they have been able to ascertain certain properties of such functions consequent on specific properties of the underlying preference relationships. For example, if a preference ordering exhibits completeness; i.e., if there is a complete binary ordering of bundles such that the individual either prefers bundle A to bundle B ($A > B$), or prefers B to A ($B > A$), or is indifferent between A and B ($A = B$), for any pair of bundles, A, B; and, if it also exhibits transitivity; i.e., $A > B$ and $B > C \Rightarrow A > C$, and, $A = B$ and $B = C \Rightarrow A = C$, $\forall$ A, B, C, then it can be proved that a utility function exists that represents that preference ordering and that is continuous. However,

> The only thing [representation theorems] establish is that such a function *exists*, not that there is any equivalence between the preference relation and the utility function "representing" it. In other words, they merely permit one to restate, in mathematical terms the verbal conditions expressing preference. (Mahoney 2001, p. 2)[9]

Moreover, utility functions can not generate any information beyond that revealed by the preferences themselves (Mahoney 2001, p. 5).

Second, because in reality individuals' preferences are prior to utility functions, such functions should be developed from observations of individuals' preferences as revealed by their actions.[10] However, in practice, such functions are not so developed. In fact, neoclassical utility functions are constructed for the sole purpose of utilization in mathematical operations, and with a keen eye for properties, that though economically irrelevant, are highly pertinent for mathematical tractability, and with a blind eye to some unavoidable implications. For example, the most commonly used utility function, the Cobb-Douglas (CD), was lifted lock, stock, and barrel from production theory,[11] as were other common utility functions; e.g., the constant elasticity of

[9]See Mahoney (2001) for an excellent analysis of the issue of "representation theorems."

[10]Although, as neoclassicals maintain, preferences are generally stable in some macro sense, that does not mean they are unchanging in a micro sense. This fact alone challenges the idea that meaningful (necessarily-individual) utility functions can be constructed or developed. Nevertheless, for the purposes of this paper, I ignore this criticism of such functions. Certainly, it cannot be denied that an individual's action demonstrates only preference in that particular context (particularly including that specific time and place); it would be illicit to generalize from any one such choice to any others. I thank an anonymous referee for stressing this point, and have adopted, in part, the language in which he made it.

[11]The CD is also the most commonly used production function. Given that utility is subjective and ordinal, and physical production is objective and cardinal, it is perhaps the most remarkable coincidence in all of economics that one specific function, the CD, is, if we are to judge by the work of neoclassicists, best suited to model both consumer choice and production.

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substitution (CES) function. It may well be that a CD is a valid model of some production processes.[12] Indubitably, however, it is an absurdity in the realm of utility theory. Let a generalized CD utility function be given by: $U_j = A\prod(x_{ij})^{\alpha i}$, where i (=1. . .n) indexes the n goods, and j (= 1...m) indexes the m bundles of goods. Then $U_j = U_k$ if any $x_{ij} = x_{ik} = 0$, and $U_h > 0$ if $x_{ih} > 0 \; \forall$ i. One property of such a utility function is that if the quantity of at least one good in a particular bundle of goods is zero the entire bundle provides absolutely no utility whatsoever. Then, as between two bundles of goods (A and B), identical in all respects save that A contains one pencil and one house and B contains no pencils but one million houses, the bundle (A) with one house and one pencil is preferred to the bundle (B) with one million houses and no pencils. Moreover, if A contains one pencil and no houses and B contains no pencils and one house, neither would be preferred to the other, nor would either provide any want satisfaction. Therefore, neoclassical utility theory, at least insofar as its most popular manifestation is concerned, must rule out the consideration of any bundles of goods in which the quantity of at least one good is zero.[13]

Moreover, neoclassical economics makes frequent use of the representative agent concept. That is, an imaginary individual is assumed to have a particular utility function, which happens to have the properties necessary to enable the application of calculus. This individual's preferences, as reflected in his utility function, are assumed to be representative of (read identical to) every other person's preferences. The purpose of this is to avoid the virtually impossible task involved in trying to aggregate individual preferences (in the form of utility functions) in some way that would result in mathematical tractability. Again, neoclassical economics starts with utility functions, rather than with actual preferences. A deep yawning gap remains between them, and no need to relate the one to the other is even recognized.

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[12]But even this is questionable for most goods, for surely, with rare exceptions, some output, however small, can be produced with a zero level of some one or more resources that could be used to produce the good; e.g., skilled for unskilled labor or vice versa, and aluminum for steel or plastic, etc.

[13]Additionally, the degree of homogeneity of CD utility functions must be between zero and one. If it is negative, optimization yields a minimum, not a maximum. If it is zero, a scale increase of the arguments does not give rise to any increase in utility. If it is one, a scale increase of the arguments gives rise to the same scale increase in utility; and if it is greater than one, a scale increase of the arguments gives rise to a greater scale increase in utility. None of these results accords with human action. However, if the degree of homogeneity of U is between zero and one, then a scale increase of the arguments gives rise to a less than scale increase in utility. This is another restriction that must be placed on utility functions. That is, the class of acceptable monotonic transformations of CD functions is limited. For example, if the CD utility function F, is homogeneous of degree γ, then any function G = G(F), where $G = F^{\delta}$ and $\partial G/\partial F > 0$, will not do if $\delta \cdot \gamma \geq 1$.

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Utility Functions and Rankings: Ordinal or Cardinal?

Neoclassical utility functions and the ranking of bundles they generate are asserted to be ordinal, not cardinal. However, although they can and do order such baskets of goods, they do not use ordinal numbers to do so, rather, they generate cardinal numbers that are then used to rank bundles. They map from the set of bundles to the set of real numbers.[14] But real numbers are cardinal not ordinal. Such functions assign a *cardinal* number to each bundle. That is, neoclassical utility functions generate cardinal numbers and therefore, a cardinal ordering from which an ordinal ranking may be developed. **Moreover, it is not an ordinal ranking that gives rise to the cardinal numbers. Indeed, the ordinal ranking *arises from* the assigned cardinal number; i.e., it is a by-product of the very cardinal number assigned to it.** Therefore, in neoclassical economics the cardinal numbers and rankings are logically prior to ordinal rankings. However, in reality, it is the ordinal ranking which is prior, and which, being prior, makes irrelevant the cardinal numbers assigned to the bundles.

For neoclassical economists the existence of these "ordinal" utility functions makes possible a virtual utopia—they can have their cake and eat it too. They get the truth of subjective valuation in ordinal utility rankings, and, also, the supposed objectivity of cardinal number rankings, which allows them to use calculus. But there can be *only* be an ordinal ranking of utilities. That is, the *only* thing that may be said in comparing two bundles is which is preferred to the other or whether neither is preferred to the other.[15]

That is the crux of the matter. Neoclassical economists act as if they can have both cardinal and ordinal rankings at the same time and in the same respect. That is, they say that because they can order bundles on the basis of the cardinal number assigned to it by a specific function, the order so generated is a rank-order, and that the utilities being so considered are ordinal. This is incorrect. Were it truly an ordinal ranking, it would not be *absolutely necessary* to use the cardinal numbers from which the ranking was generated in their mathematical calculations. Rather, the ordinal numbers corresponding to the ranking generated from the cardinal numbers could themselves be used

[14]It is important to remember that "function" is a technical mathematical term with a very precise meaning. See, e.g., Thomas (1968, p. 14): "We also speak of a function f from X to Y as a *mapping* that assigns to any element x in its domain a *unique* element y in its range such that the pair (x, y) belongs to f." Note that there is nothing that requires the elements of the range to be cardinal numbers—in fact, they may be ordinal numbers. Therefore, if utility functions were truly ordinal in any meaningful sense of the term, they would map from the set of bundles relevant for an individual to a set of ordinal numbers. However, in practice this is never done, and for good (neoclassical) reason: the calculus operators cannot be applied to ordinal numbers.

[15]Praxeologists do not accept the latter option as valid. Preferences are revealed in, and only in, action. For the praxeological critique of indifference, see Rothbard (1997, pp. 211-54; and 1993, pp. 265-67); Block (1980 and 1999).

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in such calculations. Therefore, the order generated by neoclassical utility functions is not a rank ordering in any meaningful sense of the word.

Furthermore, neoclassical economists properly maintain that the ranking of a set of bundles generated by one of their utility functions is invariant under a monotonic transformation thereof.[16] That is, although one bundle of goods from a set of bundles might be assigned the number 100 by one function, F, and the number 10,000 by another function, F^2 (a monotonic transformation of F), in either case the bundle would have the same ranking within the set of bundles. Therefore, in order to know the rank of a basket of goods, all one needs to know is its assigned number, and the numbers assigned to other bundles. Note well that all that is necessary to know in order to assign the appropriate number to each and every specific bundle is its own specific contents. No knowledge whatsoever of the contents of any other bundle or bundles is necessary.[17] Therefore, baskets of goods may be ranked without any comparison with the contents of other bundles. Most assuredly, such a ranking does not qualify as ordinal in nature. Consider the following example. Let:

1. x_i (i = 1...n) be the set of n goods that are relevant for an individual;
2. $X = X_j(x_i)$ (j = 1...m) (i = 1...n) be the set of m different bundles of the n goods that are relevant for an individual;
3. $X_j \succ\sim X_k$ be a preference relation that means bundle X_j is preferred at least as much as bundle X_k;
4. U be a neoclassical utility function such that for any bundle of goods, $X_i(x_i, y_i)$, $U(X_i) = 10x_i^{0.25}y_i^{0.25}$;
5. $U(X_1) = 80.07^+$;
6. $U(X_2) = 79.93^-$;
7. rank of X_1 = k, where k is an ordinal number (e.g., 3rd or 15th); and,
8. rank of X_2 = k+1.

Now consider an additional bundle, $X_{M+1}(16, 256) \Rightarrow U(X_{M+1}) = 80$. All that it is necessary to know about bundles X_1 and X_2 in order to rank correctly bundle X_{M+1} is that $U(X_1) = 80.07^+$, $U(X_2) = 79.93^-$, the rank of X_1 = k, and the rank of X_2 = k +1. That is, one need know nothing about the elements of bundles X_1 and X_2 (i.e., x_1, y_1, and x_2, y_2)[18] in order to rank X_{M+1}.

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[16]The use of monotonic transformations to buttress the claim that neoclassical utility functions and their attendant rankings are ordinal is considered, *infra*.

[17]It is my view that, in the words of a referee, "value cannot be attributed to a bundle without comparing to other bundles." The process of evaluation is essentially a comparative one; it is picking one thing and setting aside another. If, *arguendo*, there were only one thing to be chosen, the implication is that valuation could not occur. This, of course, cannot take place, because there is always the option between choosing and forgoing.

[18]In fact, $X_1 = X_1(16, 257)$ and $X_2 = X_2(16, 255)$.

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Compare that to a true ordinal utility function on the same two goods.[19] Let: $V = V(X)$ be a true ordinal utility function, such that:

$V(X_j) = 1^{st}$ if $X_j \succ X_k \; \forall \; k \neq j; \; k \in X$,
$V(X_h) = 2^{nd}$ if $X_h \succ X_k \; \forall \; k \neq j, h; \; k \in X$
$V(X_g) = 3^{rd}$ if $X_g \succ X_k \; \forall \; k \neq j, h, g; \; k \in X$

$V(X_m) = m^{th}$ if $X_m \succ X_k \; \forall \; k \neq j, h, g, \ldots m-1; \; k \in X$

Again consider the same additional bundle, $X_{M+1}(16, 256)$. In this case there is no way to know V(M+1) and, therefore, no way to rank X_{M+1}, save by comparing the *elements* of bundle X_{M+1} with the ranking **and** *elements* of other bundles. That is, even in a "best case" scenario, it is impossible to rank X_{M+1} absent knowledge of the elements of two other bundles.[20] It simply will not suffice to know that the ranks of bundles X_1 and X_2 are k and k+1, respectively.

Put another way, let there be two (2) bundles, A and B, to which a neoclassical utility function assigns the cardinal numbers 20 and 30, and ordinal numbers (*necessarily* based thereon) 2nd and 1st, respectively. If a third bundle, C, is now to be ranked, all that is necessary to know are the elements of bundle C and the concomitant cardinal number assigned to it by the utility function. Thus, if the utility function, operating on the elements of C, yields the cardinal number 25 for C, then the ordinal ranking becomes: B is 1st, C is 2nd, and A is 3rd. If, however, the utility function were a "true" ordinal utility function, in order to rank C, we would need to know more than that the ordinal numbers assigned to A and B are 2nd and 1st, respectively, and the elements of C. We would need to know the elements A and of B, as well.

Consider yet another example. Let there be four (4) bundles of goods, A, B, C, and D, with quantities of x and y in each as depicted[21] in Table 1. Because more is better,[22] we know B is preferred to A, C to B, C to A, D to C,

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[19]This particular ordinal utility function allows for indifference; i.e., there may be multiple firsts, seconds, etc.

[20]In a "best case" scenario, by sheer coincidence, the first two bundles that one would compare the elements of the additional bundle with would be X_1 and X_2 with the result: $X_1 \succ X_{M+1} \succ X_2$. Therefore, $V(X_1) > V(X_{M+1}) > V(X_2)$. And, because X_1 and X_2 happen to be ranked sequentially, k and k+1, respectively, the rank order of X_{M+1} is necessarily k+1, with the rank order of X_2 and all lesser ranked bundles adjusted accordingly.

[21]The cardinal utility values in Table 1 were generated using two (2) CD utility functions: $U1 = 2(x^{1/2}y^{1/2})$; and, $U2 = V + 2W(x^{1/2}y^{1/2})$ $(V \geq 0, W \geq 1)$, a specific (positive) monotonic transformation of U1.

[22]Actually, for CD type; i.e., multiplicative, functions, "more is better" is not always true, as was demonstrated, above (although it is true in this particular example). That is, in terms of neoclassical utility functions, more utility is better than less, but that is a trivial statement; if, however, the concern is for quantities of goods, then it is not at all clear that more is better; rather, whether more is better depends crucially on how "more" is

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D to B, and D to A. That is, in ordinal terms, we rank D first, C second, B third, and A fourth. And this is true whether we use U1 or U2; i.e., the ranking of each bundle is the same regardless of which function is used to rank them, or if no function is used to rank them.

Table 1

Bundle	x	y	U1	ΔU1	U1 Rank	U2	ΔU2	U2Rank
A	100	100	200	-	4th	V + 200W	-	4th
B	121	100	220	20	3rd	V + 220W	20W	3rd
C	400	400	800	-	2nd	V + 800W	-	2nd
D	420.25[23]	400	820	20	1st	V + 820W	20W	1st

Whether using U1 or U2, a neoclassicist would rank the bundles from most to least preferred using their cardinal numbers: 820, 800, 220, and 200 or V + 820W, V + 800W, V + 220W, and V + 200W, respectively. In either case he would rank them D, C, B, and A. Moreover, the mainstream economist would not even assign their ordinal numbers to them. An Austrian would rank the bundles in the same order. However, in sharp contrast, he would not do so on the same basis—he knows there can only be an ordinal ranking of utilities. That is, the *only* thing that may be said in comparing two bundles is which is preferred to the other or whether neither is preferred to the other.[24] Therefore, in the example above, Austrians maintain that the *only* things that may be said are: B is preferred to A, C to B, C to A, D to C, D to B, and D to A, but he cannot compare the relative rankings in any mathematically meaningful way.

Let us be perfectly clear on this matter: the numbers 200, 220, 800, and 820, and V + 200W, V + 220W, V + 800W, and V + 820W, have no more meaning *in reality* then would any other set of four numbers ordered from smallest to largest. Austrians know this *and* they conform their analysis thereto; i.e.,

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defined. Thus, if there is a zero quantity of any one good in a bundle, the total utility of that bundle is zero, no matter how great are the quantities of the other goods in it; i.e., the marginal utility of all the other goods in that bundle must be zero. All of which is a consequence of neoclassicists using mathematics and forgetting about underlying preferences. Austrians know that for almost any individual, if he has zero pencils and one steak in a basket of goods, that adding another steak would entail positive marginal utility, save, perhaps, for some vegetarians. However, for neoclassicists using CD type functions, their math won't admit of this reality. They would have to add an addendum to their functions that would define the method of calculating utility when there is a zero quantity of one or more goods in a basket.

[23]Referring to fractions, think of x as some good measured in kg.

[24]As mentioned in note 15, Austrians do not accept the latter option as valid. Preferences are revealed in, and only in, action.

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they eschew the use of neoclassical utility functions, and the cardinal numbers generated thereby.[25] This the neoclassicist cannot do, for in spite of paying lip service to the ordinal nature of utility, in practice, the (implicit or explicit) cardinal numbers generated by their utility functions[26] are at the core of their analyses.

Consider that in the above example, using U1, the mathematics enable us to say that B is preferred to A by 20 (whatever that means) and D to C by 20, and therefore, B is preferred to A by exactly as much as D is preferred to C. But if utility is truly ordinal then no meaningful statement may be made about the intensity of preferences. It is logically impossible to say that: B is preferred to A by 20; D is preferred to C by 20; and, therefore, that B is preferred to A by exactly as much as D is preferred to C. That is exactly the type of fallacy that results from using cardinal utility functions.

Furthermore, neoclassicists make use of indifference curve analysis and the marginal rate of substitution (MRS) to analyze consumer choice. The MRS in the two-good case is defined as: $dy/dx_{(dU=0)} = -U_x/U_y$.[27] Therefore, using either U1 or U2 as the utility function, $dy/dx = -y/x$. However, utility maximization requires that the MRS be equal to the negative of the ratio of the price of x to that of y ($-p_x/p_y$). Therefore for either bundle A or C to be optimal the prices of x and y must be the same and, therefore, the MRS = -y/x = -100/100 = -1, whereas for B or D to be optimal the price ratios of x to y must be -100/121 or -400/420.25, respectively and, therefore, the MRS = -y/x = -100/121 or -400/420.25, respectively. But -1, -100/121, and -400/420.25 are cardinal numbers, not ordinal numbers. It is difficult to see how this can be denied. **Consequently, one reason that neoclassicists are in error is precisely because, *de facto*, they switch from ordinal to cardinal utility when their utility functions generate cardinal numbers and they use these cardinal numbers in their calculations.**

Nor can the neoclassicists legitimately deny that the cardinal numbers are exactly that–cardinal numbers subject to mathematical operations. In fact, they use the cardinality of the numbers generated by utility functions in their calculations of the MRS. That is, for U = U (x, y), the MRS, dy/dx, is the ratio of the cardinal numbers, dy and dx, and, therefore is itself a cardinal number. (It most certainly is not a ratio of ordinal numbers, itself an oxymoron.) However, having used the cardinality of dy and dx for their own purposes, they wish to deny that this cardinality may be used for other purposes; e.g.,

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[25]They also eschew the use of true ordinal utility functions on the grounds that they add no information, but merely restate preferences in mathematical symbols.

[26]The marginal rate of substitution (MRS), which is at the center of indifference curve analysis, is, in the simplest case of two goods, the ratio of two cardinal numbers.

[27]Yet another way to perceive that neoclassical utility functions are cardinal in nature is as follows. Because $dU = 0 \Leftrightarrow U = \text{constant}$, U must be cardinal, as only cardinal numbers can be constants; i.e., ordinal numbers cannot be constants; e.g., 10 is a constant whereas 10th is not.

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to compute differences. In effect they claim that the nature of the numbers generated by their utility functions is contingent–it oscillates between cardinal and ordinal as the operation is division or subtraction, respectively, and therefore these numbers may be used to calculate ratios, but may not be used to calculate differences. For example, in effect for them, because x and y are cardinal numbers, dy/dx is a legitimate mathematical operation that generates a cardinal number, but, because (they maintain) $U(x_1, y_1)$ and $U(x_0, y_0)$ are ordinal numbers, $U(x_1, y_1)$-$U(x_0, y_0)$ is not a legitimate mathematical operation and does not generate a legitimate cardinal number.

Moreover, the most common "proof" that neoclassical utility functions are ordinal in nature is based on positive monotonic transformations. Neoclassicists maintain that because the ranking of bundles generated by a neoclassical utility function is maintained under any positive monotonic transformation thereof, totally regardless of the cardinal numbers assigned the bundles by the different functions, that the rankings are ordinal. Consider, for example, two such functions F and G, with G a positive monotonic transformation of F, and two bundles of goods A and B. The relationship between the numbers assigned by F to A and B is arbitrary with respect to the relationship between the numbers assigned to A and B by G, save that as A is greater than, equal to, or less than, B for F, so also will it be for G. That F and G assign different cardinal numbers to A and B is irrelevant for their ranking. Moreover, the MRS is invariant between F and G.[28] That is, regardless of whether A and B are ranked by F or by G, the ranking will necessarily be the same, as will the MRS. Because the relationships between the cardinal numbers assigned by different functions (in this example, F and G) are arbitrary and yet the ranking is maintained, and also because the (cardinal) MRSs[29] are identical, neoclassicists claim that the ranking is ordinal, and, *de facto*, that such utility functions are ordinal in nature and are dealing with ordinal utility. That is, they claim that the use of neoclassical utility functions is acceptable in a world where cardinal utility is recognized as methodologically invalid.

However, that such functions yield cardinal, not ordinal, rankings can be seen from the following thought experiment. Let there be 10 bundles of goods, X_i (i = 1,..., 10), such that the neoclassical utility function happens to assign the cardinal numbers $10 \cdot i$, to these bundles, not necessarily respectively; i.e., bundles X_1 X_2, X_3,..., X_{10} are assigned the cardinal numbers 10, 20, 30,..., 100, though not necessarily respectively. Then an 11^{th} bundle, X_{11}, can be ranked without knowing anything about the contents of any of the others. The cardinal number may be assigned without any knowledge of the contents of the other bundles. If the number assigned to it is, say, 35, then one knows

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[28]The MRS for F and G are F_i/F_j $\forall$ i, j and G_i/G_j $\forall$ i, j, respectively. But, $G_i/G_j = G_F \cdot F_i/G_F \cdot /F_j = F_i/F_j$, QED.

[29]That the MRSs are cardinal numbers is a fact that is never mentioned by the neoclassicists; the only thing they note is that they are identical, as between different utility functions representing the same set of preferences.

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instantly that it ranks immediately below (above) the bundle to which the number 40 (30) has been assigned. The cardinal number can be assigned without comparison to other baskets of goods. For example, given a CD function and a bundle one can immediately know its cardinal number and can immediately tell where it ranks in the order. If its CD# = 35, then it is between 40 and 30, but if 40 is ranked 7th and 30 is ranked 8th, then 35 is now ranked 8th, and the ranking of other baskets of goods is adjusted, *mutatis mutandis*. Therefore, it is unnecessary to compare the elements of X_{11} with those of any other bundles in order to rank the bundles.

Compare that to a true ordinal utility function that assigns the ordinal numbers first through tenth to these same bundles, again, not necessarily respectively. Then one has no idea where the 11th bundle ranks. That is, without specific knowledge of the content of the other bundles, one cannot ordinally rank it, for there is no way to assign an ordinal number to it save by comparison of its contents to that of other bundles. That is, given an ordinal function and a bundle one cannot immediately know its ordinal number or immediately tell where it ranks in the order. X_i must be compared to X_j; if X_i is preferred to X_j it must then be compared to a bundle with a higher ordinal ranking, if lower, then lower.[30] This process (i.e., these comparisons) must be repeated until the exact rank order of X_i is established.

Alternatively, consider a neoclassical utility function, $U = 10\ x^{0.25}y^{0.25}$. If we know that bundle X_1 consists of x =16, y =256, then we know that U = 80. However, 80 is a cardinal number that tells us nothing about the rank of X_1. The utility function has not provided any economically meaningful information. But how can an ordinal utility function tell us nothing about rank? In fact, the rank order is precisely the information that would be produced by a true utility function. Rank order implies at least two things to be ranked. When there is only one, then, perforce, there can be no rank, as in the present case.

To conclude this section I note that there is no reason in mathematics, and certainly none in logic or the analysis of human action, that requires utility functions to assign cardinal numbers to bundles of goods. In fact, not only could ordinal numbers be assigned, they *should* be assigned instead of cardinal numbers. That is, because utility is, admittedly,[31] ordinal, if it is desirable to express preference rankings among different bundles of goods as mathematical functions, such functions should assign the appropriate *ordinal* number to each bundle, rather than a cardinal number and then maintaining that the only importance thereof is its use in ranking bundles. Why bother assigning cardinal numbers that then have to be interpreted as ordinal, i.e.,

[30]Only if by sheer coincidence neither is X_i preferred to X_j nor is X_j preferred to X_i does the process of comparison stop and X_i receives the same ordinal number as X_j, with the ordinal numbers/ranking of all lower numbered/ranked bundles being adjusted, accordingly. The usual caveats about indifference for Austrians still apply, however.

[31]By both Austrians and neoclassicals, presumably.

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converted to ordinal numbers, when ordinal numbers could be assigned in the first place? Occam's razor would certainly favor first using ordinal numbers in this case. The answer, of course, is that the only (neoclassical) reason for assigning the cardinal number is to prepare the way for the use of calculus.

The Relationship between the Nature and the Purpose of such Functions

Neoclassical economists wish to make economics scientific in the same way as are the other "hard" sciences such as physics. They desire to develop mathematical models of that which is being studied (purposeful human action, in the case of economics) and then use data to test hypotheses arising from the theory. Although neoclassicists in economics also use other tools of mathematics, calculus is the key subdiscipline, because it allows calculation of *maxima* and *minima*. This is essential, because of the importance to economics of such concepts as utility and profit maximization and "cost" minimization. However, the very use of calculus requires cardinal numbers; calculus cannot possibly be used in conjunction with ordinal numbers (Thomas 1953, pp. 11-14). Moreover, in order to obtain more than a few useful generalizations[32] from the use of calculus, specific functional forms, with attendant specific cardinal implications, must be employed. In utility analysis this means a cardinal number must be assigned, at least implicitly, to each bundle.

Consider, then, the sole purpose for which utility functions are constructed: to manipulate them mathematically, and especially to determine the conditions for the maximization of utility subject to a budget constraint. This usually shows up as a trivial calculus problem: maximize $U = U(x_1,...,x_n)$ subject to $B = \Sigma p_i x_i$ $(i = 1...n)$, where U is the utility function, x_i $(i = 1...n)$ are the n goods upon which utility depends, and p_i is the price of a unit of x_i $\forall$ i, and B is the fixed budget constraint.[33] The solution, using standard notation, is: $U_i/U_j = p_i/p_j$ $\forall$ i, j, $i \neq j$. Of course, p_i/p_j is the objective exchange rate—the rate at which people can trade x_j and x_i for each other. Regardless of whether one interprets U_i/U_j as the ratio of two marginal utilities or as the MRS[34], it is a subjective exchange rate[35]—the rate at which people desire to trade x_j and x_i for each other. Now, it is obvious that the magnitude of p_i/p_j is a cardinal number; for example, let $p_i = \$10/x_i$ and $p_j = \$5/x_j$, then $p_i/p_j = 2x_j/1x_i$. That

[32]It should be noted that the calculus is not necessary to these generalizations; they can be reached quite easily through simple deductive logic.

[33]Sometimes a time index is included, but this is irrelevant for the point being made.

[34]In the case of three or more goods, the MRS = dx_i/dx_j, x_k = constant $\forall$ $k \neq i, j$.

[35]If one interprets U_i/U_j as a ratio of marginal utilities, presumably the dimensions of U_i and U_j would be utils/x_i and utils/x_j, and consequently the dimensions of U_i/U_j would be x_j/x_i. Alternatively, if one interprets U_i/U_j as the MRS ($-dx_j/dx_i$) presumably the dimensions of dx_i and dx_j are x_i and x_j, respectively, and the dimensions of U_i/U_j would then be x_j/x_i. In neither case is U_i/U_j dimensionless. But if U_i/U_j has dimensions, they are necessarily cardinal, not ordinal.

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is, the rate at which x_j can be traded for x_i is $2x_j$ for $1x_i$. Moreover, because $U_i/U_j = p_i/p_j$, and $p_i/p_j = 2x_j/1x_i$, U_i/U_j cannot be equal to 2/1, because $2/1 \neq 2x_j/1x_i$; rather U_i/U_j must be equal to $2x_j/1x_i$. But, even if the laws of mathematics were somehow suspended to allow 2/1 to be equal to $2x_j/1x_i$, 2/1 is still a cardinal number, two; i.e., it is twice one, not merely greater than one, and it is one-half four, not merely less than four. And, 2/1, most assuredly, is not second x_j for first x_i. Put differently, there are no ordinal numbers involved. If, for example, x_i and x_j are bushels of wheat and corn, respectively with $p_i = \$10/x_i$ and $p_j = \$5/x_j$, then the first order conditions for utility maximization, $U_i/U_j = p_i/p_j$, require that $U_i/U_j = 2x_j/1x_i$ (i.e., $2x_j$ trades for $1x_i$); however, this is cardinal/objective not ordinal/subjective. That is, the ratio of the marginal utilities when utility is maximized is 2 bushels of corn to 1 bushel of wheat, **not** plain old two to one or *second* bushel of corn to *first* bushel of wheat. This is hardly ordinal or subjective analysis; in fact utility cannot be both subjective and cardinal.

Nor does it make any difference if the solution is written $U_i/p_i = U_j/p_j \; \forall$ i, j, $i \neq j$. If one interprets the $U_i \; \forall$ i as dimensioned marginal utilities, presumably the dimensions of U_i and U_j would be utils, and consequently the dimensions of U_i/p_i and U_j/p_j would be $(\text{utils}/x_i)/(\$/x_j) = \text{utils}/\$$ and $(\text{utils}/x_j)/(\$/x_j) = \text{utils}/\$$, respectively. In this case, utility has the dimension utils, and therefore utility is necessarily cardinal, not ordinal, in nature. Alternatively, if one interprets the $U_i \; \forall$ i as nondimensioned marginal utilities the dimensions of U_i/p_i and U_j/p_j would be $1/(\$/x_j)=x_i/\$$ and $1/(\$/x_j) = x_j/\$$, respectively. But then because $U_i/p_i = U_j/p_j \; \forall$ i, j, $i \neq j$, we arrive at the conclusion that, in terms of dimensions, $x_i/\$ = x_j/\$ \Rightarrow x_i = x_j$. Therefore, the dimensions of two different goods x_i and x_j are identical; i.e., the two *different* goods are the *same* good. Moreover, as the condition holds for all goods, *each and every different good must be the same good.*

The two main conclusions derived from the use of utility functions are that utility maximization and, *a fortiori*, equilibrium for the consumer require that: (1) the MRS between any two goods be equal to the negative of the ratio of the prices of the two goods; and (2) the ratio of the marginal utility to the price of any good be equal to the negative of the same ratio for any other good. However, as proven in this section, both of these conclusions are *mathematically invalid.*

Applicability of the Results Derived from Mathematical Operations on Neoclassical Representative Functions to Individual's Actual Preference Rankings

Neoclassical economics has various "representation" theorems supposedly used to prove that the results of mathematical operations applied to utility functions pertain also to the underlying preferences of the relevant individual. However, these theorems do nothing of the kind. They merely prove that such functions can be constructed and, that given certain characteristics of the

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underlying preference relationship, they have certain (mathematically) desirable properties. Of fundamental importance is the fact that these theorems in no way prove that the utility function is equivalent to the preference ordering it represents. Therefore, it is invalid to assert or imply that (any) results obtained by means of mathematical operations applied to such functions necessarily hold true for the underlying preference relationships. More generally, the best that may be said is that utility functions are merely restatements of preference rankings in the language of mathematics.

Suppose, furthermore, that somehow neoclassical utility functions were equivalent to the underlying preference relationships, such that mathematical results derived from these functions applied to the real relationships. Then, because these functions are inherently cardinal, the inevitable conclusion would be that individuals' preferences themselves are also cardinal. But neoclassical economists, themselves, have long since concluded that individuals' preferences are ordinal, not cardinal.

Additionally, as noted above, in making interpersonal utility comparisons, as they must, courts make use of experts' testimony. And so also do legislatures and governmental agencies in their work, that also, necessarily involves such comparisons. It stands to reason that if neoclassical utility functions actually represented people's preferences, and the mathematical results derived therefrom applied to the real world, such functions would make their way into expert-economists' testimony—testimony that is both impeachable and for which economists can be held liable for perjury. What is certain is that neoclassical economists do not introduce such functions into their testimony. The reasons are obvious.

Differentiability and Continuity

Consider the issue of continuity. Neoclassical economists apply calculus to utility functions in order to analyze human action. This necessitates that these functions be differentiable, and, therefore, continuous.[36] Therefore, they do not develop their utility functions by making empirical studies of individuals' preferences (as revealed by their actions) in order to determine specific functions that would or do represent individuals' preferences.[37] Rather, they

[36]"Differentiability implies continuity" (Thomas, 1968, p. 99). It should be noted that, although much is made of continuity in the neoclassical literature referring to differentiability, continuity, though a necessary condition, is not a sufficient condition for differentiability.

[37]This is not to deny that many of the functional forms used in *econometrics* were chosen after preliminary analysis of data. However, the set of forms from which the chosen forms were/are taken was/is not open ended; rather, it was/is restricted to those that are differentiable and tractable, and also (directly, indirectly, or at least, approximately) estimable. It should be noted that *any* known set of preferences can be exactly represented by an appropriately chosen polynomial function. For example, if A's utility depended

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merely choose either a nonspecific, assumed-differentiable function, or certain specific types of differentiable functions.[38] In the former case, the functions are assumed to have certain desirable properties, including continuity; in the latter cases the actual functions chosen exhibit the desirable properties, including differentiability. (It should be noted that one of the desirable properties for specific functions is mathematical tractability.)[39]

However, utility functions are supposed to be representations of real *individuals'* actual preferences, and, undeniably, many of the goods that are arguments of individuals' utility functions are discrete; e.g., automobiles, houses, furniture and appliances, etc. Therefore, of necessity, the utility functions are discontinuous.[40] Thus, the very (discrete) nature of many goods is all by itself sufficient grounds to invalidate the uses which neoclassicists make of utility functions. Neoclassicists evade this aspect of reality[41] through the simplistic

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upon the quantities of n goods, and A ranked z bundles of the n goods, a utility function could, in principle, be found that would exactly represent the ranking of the z bundles. (It is immaterial to statistics, but not to economics/praxeology, whether such bundles purport to be contemporaneous alternatives or, instead to exist at differing points of time.) Put another way, in the n+1 (utility plus the n goods) space a utility hyper-surface could, in principle, be found such that each and every one of the (z) data points corresponding to the z bundles would lie precisely on the utility hyper-surface. Such a function is of no use in econometrics because, having no degrees of freedom, there are no unknown parameters that need be, or can be estimated; i.e., all is known, there is nothing to be estimated, no work for statistics to do. Moreover, in practice, the normal course of events is to take one, or at most a few of the standard functional forms and, using various statistical techniques, attempt to determine which fits the data best, based upon various criteria; i.e., the function(s) is/are picked first and only then are the data fitted thereto. In many or most cases the data are selected and are modified/transformed based on the restrictions imposed by econometric necessity.

[38]For example, CES (including CD) functions.

[39]That is, the functions actually selected are chosen, not because they actually represent real people's preferences, but rather, because they allow calculus to be applied, and that in a mathematically tractable way; i.e., they do not choose to use a specific differentiable function unless it also happens to be mathematically tractable.

[40]It is true that some noncontinuous functions could be treated as continuous provided that, relative to the relevant values of x, the minimum value Δx could take on was sufficiently small so that $\Delta x/x$ was of an insignificant magnitude. For example, for the Cobb-Douglas function $U = c^{\alpha}h^{\beta}$, where c and h are cars and houses, respectively, and therefore, the minimum value that either Δc or Δh may take on is one (1), if the relevant values of c and h are in the neighborhood of 1,000,000, such that $\Delta c/c \approx \Delta h/h \approx 0.000001$, the function could be treated as if it were continuous, and the partial derivatives taken and evaluated. However, in the real world, the relevant values of c and h are much more likely to be integers such as one or two, and certainly, save for a very few people, rarely would exceed five. Certainly for values of $\Delta c/c$ and $\Delta h/h \geq 0.2$ this function cannot be treated as continuous.

[41]What of the argument contra, "What's the harm?" or "No harm, no foul." or "Yeah, but so what?" That is, continuous and differentiable cardinal functions indeed are unrealistic, but they make it easier to understand a few basic points, such as consumer equilibrium. In this view, the assumption of continuous and differentiable cardinal functions is

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expedient of assuming that their utility functions are continuous and differentiable.[42]

DIMENSIONS[43]

This brings us to the problem of dimensions.[44] (In the analysis that follows, I attach the relevant units,[45] in brackets, to the variables as appropriate.) Let: $U = (x\ [kg])^{0.25}(y\ [m^2])^{0.25}$; $P_x = \$5/kg$; $P_y = \$20/m^2$; and, $B = \$1{,}000$; where: U

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like a heuristic device, or a rule of thumb; e.g., when calculating the momentum of a body, the formula p = mv, where p is momentum, m is mass, and v is velocity, provides an excellent approximation to the correct value, unless the speed of the body is a significant fraction of that of light.

The problems with this response are several, and serious. First, this is not at all how the concept of continuous and differentiable cardinal functions operates in economics. Nowhere is it ever stated that these are merely approximations, and not fully scientifically accurate; rather, they are paraded as not only entirely valid, but as constituting the very litmus test for sophisticated economics. One reason Austrian economics is rejected by mainstream practitioners is due to the supposed lack of mathematical sophistication of the latter. Second, economists have been led by these improper assumptions to fallacious public-policy recommendations, for example, antitrust. It is only a slight exaggeration to say that the entire intellectual case for antimonopoly legislation is based on the foundation of continuous and differentiable cardinal functions. For an explicit analysis along these lines see Rothbard (1993, p. 644). For other studies which make use of this insight see Anderson, et al. (2001); Armentano (1991); Block (1994); DiLorenzo (1997); Boudreaux and DiLorenzo (1992).

[42]For other Austrian critiques of neoclassical mathematical economics see Mises (1977); Leoni and Frola (1977); Rothbard (1993).

[43]On the failure of neoclassical economists to consistently and correctly use dimensions/units in their work, see Barnett (forthcoming).

[44]Schumpeter (1986, p. 1062, n. 1) was aware of the *necessity* of defining units in order to measure things.

> A quantity or magnitude (the Greek μεγυος) is defined as anything that is capable of being greater or smaller than some other thing. This property implies only transitivity, asymmetry, and aliorelativity (the last term meaning that no thing can be greater or smaller than itself). It also covers the relation of equality, which is however symmetrical and reflexive (the latter term meaning the opposite of aliorelative). Now, quantity in this very general sense does not imply measurability, which requires fulfillment of two more conditions: (1) **that it be possible to define a unit;** (2) that it be possible to define addition *operationally*, i.e., so that it can actually be carried out. (emphasis added)

In an otherwise scathing attack on Cassel's theory of interest, Böhm-Bawerk (1959, pp. 196-201) acknowledges that the correct use of units is a necessary, but not sufficient, condition for economic theories. The author thanks Roger Garrison for pointing out this citation to me. Also see Garrison (1988, pp. 49-52) in this regard.

[45]The units used, from the international system of units-Le Système Internationale d' Unites, are kilogram (kg) for mass and square meter (m^2) for area, and for money the dollar.

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is the utility function; x is food, measured in kg; y is shelter, measured in m^2; P_x and P_y are the prices in \$/kg and \$/m^2 for food and shelter, respectively; and, B is the budget constraint.

The budget constraint equation is: \$5/kg • x[kg] + (\$20/ m^2) • y[m^2] = \$1,000 and its slope is: $dy_{(B)}[m^2]/dx[kg] = -0.25\ m^2/kg$. Of critical importance is that the slope of the budget constraint is in terms of m^2/kg. It is, most emphatically, not a pure magnitude. And this dimensioned term has real economic meaning—in the market one can exchange food for shelter at the rate of four kilograms of food for one square-meter of shelter, and vice versa—which meaning would be totally absent were it not for the units. That is, if the slope was solely -0.25, as opposed to -0.25 m^2/kg, no economic meaning whatsoever would attach to it.

Of course, neoclassical analysis requires for utility maximization that the utility curve be tangent to the budget line; i.e., that the slopes of the utility curve and the budget line be equal.[46] The slope of the utility function is: $dydx(_U) = -y/x$. However the only way that -y/x can be equal to -0.25 m^2/kg is if y has the unit m^2 and x has the unit kg.[47] Moreover, because the slope of the budget constraint *necessarily* has dimensions, if the slope of the utility function does not have the *same* dimensions, or *a fortiori*, if it has no dimensions at all, the two are necessarily incommensurable. That is, there cannot be a solution to the maximization problem. Without dimensions, to claim that there can be a solution to the maximization problem is of the nature of saying that, e.g., 100 (or perhaps 200) can be exchanged for a ton of steel in the market. One hundred WHAT? one wants to shout. But if the utility function does not have dimensions, there cannot be any answer to the question. It is simply 100 (or 200). But there is the rub. For if neoclassical utility functions have dimensions, as they *must*, if their values are to be maximized, which is the primary, if not sole, purpose for their existence, then they are of necessity cardinal. That is, they are cardinal and not ordinal. For the very essence of dimensions/units is cardinality; i.e., the ability to make cardinal comparisons.

Summary and Conclusion

In sum, the cardinal utility numbers generated by neoclassical utility functions provide more information than do their ordinal counterparts. In fact, for any given set of bundles they contain all of the information implicit in ordinal utility numbers for the same set, plus they provide additional information concerning the intensity of the preference for any one bundle relative

[46] In cases of more than two goods, the requirement is that the utility (hyper-) surface be tangent to the budget (hyper-) plane; i.e., that $U_i/U_j = p_i/p_j \ \forall$ i, j.

[47] Alternatively, from a purely mathematical perspective, y could have the units m^2/kg and x could be dimensionless, or x could have the units kg/m^2 and y could be dimensionless, or y could have the units 1/kg and x could have the units 1/m^2, but, from an economics perspective, these are absurd.

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to any other. It is precisely because utility functions cannot be used to calculate ordinal rankings of bundles without prior calculation of their cardinal utility numbers that the use of utility functions is unacceptable for economic purposes. Moreover, although meaningless with respect to the reality of actual individuals' preferences, this extra information is harmful because it is misleading.

I conclude by reiterating the purpose of this article. I have attempted to demonstrate that neoclassical utility functions are an invalid means of analyzing consumer behavior for three reasons: first, and most important, because such functions, and their attendant rankings, are cardinal, not ordinal in nature; second, because, with respect to the set of bundles relevant to actual human beings, such functions are not continuous and, therefore, not differentiable; and, third, because such functions do not correctly, consistently, and properly include dimensions/units.

Let me put this in another way. I will accept the validity of utility functions as soon as its proponents can show me how to perform basic mathematical or arithmetic operations on such ordinal numbers as 1^{st}, 3^{rd}, 6^{th}, and 17^{th}.

ADDENDUM

Consider the following thought experiment. There are four sheets of paper, numbered one through four. There is a cardinal utility function, F, and an ordinal utility function, G. There are four bundles of goods, A, B, X, and Y. Written on one side, the back, of sheets one through four is the list of the elements that comprise bundles A, B, X, and Y, respectively. Using F, cardinal utility numbers 100 and 120 are generated for A and B, respectively. These numbers are written on the obverse sides of sheets one and two, respectively. Additionally, because 120 > 100, 2^{nd} and 1^{st} are also written on the obverse sides of sheets one and two respectively. Using G, an ordinal utility number, 2^{nd} and 1^{st} are generated for X and Y, respectively. These numbers are written on the obverse sides of sheets three and four, respectively.

Two additional bundles, C and Z, are now considered using two additional sheets of paper, five and six. Written on one side, the back, of sheets five and six is the list of elements that comprise bundles C and Z, respectively. Using F, a cardinal number, 110, is generated for C. This number is written on the obverse side of sheet five.

Then, using only the obverse sides of sheets one, two, and five, bundles A, B, and C can be cardinally ranked: B (120) > C (110) > A (100). Moreover, B is greater than C by 120-110 =10 or B is equal to (12/11)·C. Additionally B is greater than A by 120-100 = 20 or B is equal to (6/5)·A. And, C is greater than A by 110-100 = 10 or C is equal to (11/10)·A. Furthermore, A, B, and C can be ordinally ranked on the basis of their cardinal numbers: B -1^{st}; C -2^{nd}; and A -3^{rd}. This last sentence might strike some readers as strange; after all, they might ask, how can it be valid to "ordinally rank" bundles on the basis of their

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cardinal numbers? Surely, it might be thought, ordinal rankings should be based upon *ordinal* numbers. However, for neoclassicists using utility functions, the ordinal ranking, B > C > A, arises from the cardinal ranking, U(B) = 120 > U(C) = 110 > U(A) = 100; i.e., the reason B is ranked first and assigned the ordinal number 1st is that its cardinal utility number is 120, which is greater than the cardinal utility numbers of C and A, 110 and 100, respectively. And, the reason that C is ranked second and assigned the ordinal number 2nd is that its cardinal utility number is 110, which is less than the cardinal utility number of B, 120, and greater than the cardinal utility number of A, 100. Lastly, the reason A is ranked third and assigned the ordinal number 3rd is that its cardinal utility number is 100, which is less than the cardinal utility numbers of both B and C, 120 and 110. That is, the ordinal ranking B >C >A and the ordinal numbers, B – 1st, C – 2nd, and A – 3rd, are derived from the cardinal ranking U(B) = 120 > U(C) = 110 > U(A) = 100. The point is that bundles A, B, and C can be ordinally ranked, but–for neoclassical economists–*the ordinal ranking is based on, **yea derived from**, their cardinal utility numbers.*

However, when we try to operate on bundle Z with G, we are stymied. We cannot operate on Z with G using only the information as to the elements that comprise Z and the obverses of sheets three and four. In fact, in order for G to generate an ordinal number for Z we must see the backs of sheets three and four, as well as that of sheet six.

The logical conclusion is that F is truly a cardinal utility function, and that any ranking of bundles based on such a function is cardinal in nature. Moreover, though an ordinal ranking can be generated from the cardinal ranking, the ranking is *essentially* cardinal in nature, with the ordinal ranking merely a by-product. Moreover, to use only the ordinal numbers generated as a by-product by cardinal utility functions is to fail to make use of the valuable information contained in the cardinal numbers that is not contained in the ordinal numbers.[48]

Furthermore, a truly ordinal utility function, such as G, cannot generate cardinal numbers or a cardinal ranking.

APPENDIX

Miller (1997, G-16); Ekelund and Tollison (1994, pp. 139-46); Frank and Bernanke (2001, pp. 106-11); and, Case and Fair (2002, pp. 111-13) are examples of principles level books, in which "utils" make an appearance. McCloskey (1982, pp. 41-48); Nicholson (2002, p. 78); and, Katz and Rosen (1991, pp. 54-60) are cases in point of intermediate level books in which "utils" are relied upon for purposes of economic analysis. Furthermore, it is

[48] Of course, such information is spurious; nevertheless, logically, if one uses a cardinal utility function, one should use it optimally, including using all of the useful information generated thereby.

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interesting to note the following: (1) McCloskey (1982, p. 41), in discussing "an old fashioned way of looking at indifference curves and the consumer's choice that has been declared dead many times but refuses to stay in its coffin" uses "joys" (a unit of happiness) to measure happiness (utility), whereas in the section on indifference curves McCloskey (1982, p. 31) states that "his utility [happiness] would be 30 units;" note the absence of the prepositional phrase "of X," and particularly of the object of the preposition, X; i.e., McCloskey fails to tell us 30 units of *what*. (2) Katz and Rosen (1991 p. 56) state that "just because an ordinal utility function allows us to associate a certain number of utils to each bundle does not mean that we can objectively measure 'happiness.' Such an interpretation is ruled out because utils are only ordinal numbers." However, as noted above, units of necessity involve cardinality, not ordinality. (3) Nicholson (2002, p. 78) states, "that the units of utility measure (what we have, for lack of a better name, termed a util) drop out when constructing the MRS," as if the fact that the units drop out means they weren't there in the first place; but, again, units of necessity involve cardinality, not ordinality. (4) Frank (1991, pp. 91-95) and Varian (1992, p. 97) differentiate a utility function. They do so explicitly, with no reservations or apologies. It is difficult to see how this is possible if utility is purely an ordinal phenomenon.

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AUSTRIAN BUSINESS CYCLE THEORY: VARIATIONS ON A THEME

JOHN P. COCHRAN, STEVEN T. CALL, AND FRED R. GLAHE

> If a bank does not expand circulation credit by issuing additional fiduciary media (either in the form of banknotes or in the form of deposit currency), it cannot generate a boom.
>
> –Ludwig von Mises, *Human Action*[1]

Sir John Hicks in 1967, in his critique of Friedrich A. Hayek's trade cycle theory, argued that Hayek's theory was not a theory of the credit cycle. It was instead,

> an analysis–a very interesting analysis–of the adjustment of an economy to changes in the rate of genuine saving. In that direction it does make a real contribution. But it is a contribution which, when it was made, was out of due time. It does not belong to the theory of fluctuations, which was the centre of economists' attention in 1930; it is a fore-runner of the growth theory of more recent years. In that application we can still make something of it. (Hicks 1967, pp. 210-11)

A capital-based macroeconomics as developed in Garrison (2001) provides an extended graphical framework of a Hayekian model in a growth context that maintains, clarifies, and expands the cycle aspects of the model. Growth may be sustainable when it is preference-induced growth. Policy-induced growth is unsustainable growth and as such induces cycles into the

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[1]Murray Rothbard provided the citation in personal correspondence to Fred R. Glahe (February 21, 1994) and added, "The basic point is that banks only generate a cycle by expanding (fractional reserve) credit; the key is the act of credit expansion, not whether their interest charge was correct." The quote is from Mises (1966, p. 795, n. 5).

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growth process. While the modern mainstream assessment is that U.S. data support an interpretation that "fluctuations are best analyzed as being about trend rather than being beneath potential" GDP (Delong 2000, p. 92), a capital-based approach implies that cycles include both elements about trend and beneath potential.

A capital-based macroeconomic model helps one understand the myriad number of separate but interrelated decisions that determines a long-run growth trend, changes in the trend, and fluctuations about the trend. While the boom-bust cycle is always generated by circulation credit, there are at least three ways in which circulation credit can enter the system. How and why the created credit enters the system can lead to significant historical variation in the boom-bust pattern of economic activity implicit in Austrian business cycle theory. While this analysis leads one to expect significant variations in the pattern of fluctuations around the trend (cycle phenomena), all variations predict the associated greater variability in investment (including variations in inventories and consumer durable purchases) relative to total output and consumption that is consistently picked up in economic data series.[2]

Growth and Cycles

Garrison (2001, pp. 54-56), in his basic framework for a capital-based macroeconomics, treats secular growth as an almost automatic, self-sustaining process. However, a better starting point for an Austrian interpretation of the growth/cycle interaction is Garrison's concept of sustainable versus unsustainable growth.[3] In a capital-based macroeconomics, sustainable growth occurs when investment exceeds depreciation and is financed by available saving (Garrison 2001, pp. 63-67). Growth is sustainable because it is consistent with preferences and resource availability. Regardless of its actual rate, such growth should be of no concern to monetary policymakers, particularly those concerned with accelerating inflation. Sustainable growth in a sound money environment or under a policy regime following a productivity norm should be accompanied by declining prices.[4] In broad conceptual terms, sustainable growth may be pictured as a continuous outward shift of

[2]These are the stylized facts about business-cycle phenomena that the real business cycle literature attempts to explain. The Austrian theory leads one to expect these results *a priori*. These facts are presented in Romer (2001, pp. 168-72).

[3]Salerno (2001) has provided an insightful criticism of the concept of secular growth as presented in Garrison (2001, pp. 54-56). This criticism, however, leaves intact the more important concepts of sustainable and unsustainable growth as developed by Garrison.

[4]See particularly the recent article "Money, Central Banking and Monetary Policy in the Global Financial Arena" by Jerry Jordan (2001), president of the Federal Reserve Bank of Cleveland. George Selgin made a similar argument in 1997.

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the Production Possibility Frontier (PPF) and a loanable funds market in equilibrium. The interest rate in the loanable funds market must be consistent with the broader time market represented by the margin between input prices and expected future output prices.[5] Such growth may be sustainable if the dynamics continue to favor investment in excess of depreciation while also being consistent with preferences and resource availability.[6]

Growth becomes unsustainable when it is not consistent with underlying preferences and resource availability. As such, it must be policy-induced, not preference-induced, growth. Garrison (2001, p. 76) illustrates a nonsustainable growth process by modeling the path of an economy responding to a credit expansion initiated by a central bank. The credit expansion is the familiar Mises-Hayek Austrian business cycle theory. If the economy is at full employment when a credit expansion begins, unsustainable growth occurs as the economy begins to produce, temporarily, outside its production possibility frontier (PPF) and the mix of output shifts towards investment without a corresponding change in time preference. The capital-based macro model explains the interactions between money, credit, and investment that set up conditions for unsustainable growth as illustrated by Garrison's (2001, Figure 4.4, p. 69) "dueling production structures." The introduction of the competing production structures, while partially based on the writings of Hayek and Mises, makes explicit the resource misallocation and shortage that makes the crisis inevitable once the process of unsustainable growth has begun. Consumer preferences, augmented by an interest-rate-induced overconsumption, are pulling resources into a shorter structure of production, while the credit expansion is attempting to attract resources to support a longer production structure. The resource base is ultimately not sufficient to allow completion of both structures simultaneously.[7]

---

[5]Kirzner, referring to Mises, writes, "He relies on the reader's understanding . . . that the money rate of interest simply corresponds, in a smoothly running economy at a given level of production, to the excess value of consumer goods at a given date, over the value—the spot prices—of the inputs invested at an earlier date in their production" (2001, p. 141).

[6]Sustainable growth does not imply a fixed long-term rate of growth. Following Salerno (2001, p. 60), such growth should not be interpreted as an economy on automatic pilot. The stylized trend is the result of and part of a historical process that results from a "dynamic coordination of entrepreneurial plans with historical development of time preferences, the size and quality of the labor force, natural resource endowments, and technological progress." Note how many choices must be confronted and decisions made over and over again to keep the economy not only growing, but growing at a relatively stable average rate.

[7]This scenario is an updated version of the benchmark case used by Hayek in *Prices and Production* (1967).

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CYCLE PHENOMENA: VARIATIONS ON A THEME

The boom-bust, as presented by Garrison, is the traditional Mises-Hayek business cycle model put in a growth context. A central bank/fractional reserve banking system creates credit. The supply of loanable funds artificially increases and, as in the sustainable savings driven growth process, the funds finance business expansion as investment increases. This policy-induced growth process cannot be sustainable.

But this is not the only way central bank intervention can create a tendency towards unsustainable growth. To illustrate other unsustainable growth paths, one must first develop other sustainable growth processes. Garrison (2001, pp. 57-84) provides a step-by-step graphical presentation illustrating how a different sustainable growth process might originate. A technology shock can increase the demand for loanable funds. Investment increases, as does the natural rate of interest and saving. Growth associated with the new technological possibilities can be consistent with underlying tastes and resource constraints and hence can be sustainable.

Cochran (2001) uses the Garrison framework and insights from Lewin (1999) to critique real business cycle theory.[8] Cycle-like phenomena however, are explained by random productivity shocks that may be positive (growth enhancing) or negative (growth impeding). The fluctuations are actually optimal or equilibrium adjustments to continuous positive and negative shocks to the economy.

An Austrian capital-based macroeconomics provides a better explanation of the fluctuations emphasized in the real business cycle literature. While positive productivity shocks may be interpreted as exogenous, the money and credit expansion that accompanies the economy's response to the shock leads to a mix of economic growth that is partly sustainable–the growth attributable to the productivity shock, and growth that is unsustainable–additional growth in investment and GDP that is attributable solely to the credit expansion.

Often overlooked in Austrian analysis is the transition of the economy from a higher to a lower growth path (or even a movement to a negative growth path) caused by an increase in consumption due to an increasing time preference. Assuming a smooth transition, this preference-induced change reduces the supply of loanable funds and increases the natural rate of interest. Initially, consumption increases relative to investment, and investment falls relative to GDP. If the new lower level of investment exceeds depreciation, growth may still be sustainable, but at a lower rate. The long term will see lower GDP when compared to the previous path.[9] No growth will occur if

[8]The analysis draws heavily on Cochran and Glahe (1999, pp. 95-101). See particularly Figures 1-4.

[9]Such a transition may in fact not be smooth. This top-down change requires the abandonment of some currently existing longer processes and a shift of resources to

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the new lower level of investment equals depreciation. With consumption of capital, the frontier shifts inward and the economy will experience preference-induced negative growth.

An increase in consumption (decrease in saving) may, however, be accompanied by a credit expansion that keeps the market interest rate equal to the old natural rate. While the credit may be initially given to consumers to finance greater consumption, the important consideration is not who actually gets the injection, but who are the marginal borrowers–that is, who would have been without credit if the market had moved directly to the new natural rate (Machlup 1940). Compared to the old position, the economy bubbles above the frontier with an increase in consumer spending relative to investment spending. But compared to the new equilibrium, the pattern is similar to the credit expansion case–there is likely to be both over-consumption and over-investment. The credit expansion allows a greater source of funds for business investment. Instead of starting a new longer production structure, the funding, in this case, allows business to continue to follow an already completed production structure.

Implications for the Bust

In the first two credit expansion cases, a clear crisis develops in the middle of the dueling production structures. Those attempting to lengthen the structure find that demand may not materialize in the necessary later stages as those attempting to shorten the structure (those responding to rising consumer demand) demand a different capital/resource mix from the mix being provided by the developing longer structure. In addition to a slack demand, input prices are likely to increase due to the increased competition from early stages. Malinvestment becomes apparent as some businesses are caught in this squeeze–slack demand for output and higher input prices. Plans cannot be completed as anticipated. Production may be cut back or discontinued altogether. Resources are released for other potential uses. However, those businesses attempting to respond directly to higher consumer demand may find their plans thwarted by a lack of needed complementary resources. Labor released from the declining early stages may not be easily absorbed into the expanding later stages of production, as the necessary complementary capital goods may not be readily available, if, as is likely, some of the capital goods created during the boom are not immediately useful in the expanding industries.

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shorter, less durable, less productive processes. Many of the features of a production structure–capital specificity and resource complementarity–may make it difficult for an economy to make this transition to a lower growth path smoothly.

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Because the third credit expansion case involves funding an already completed production structure, the process may continue without a significant crisis for some time. While businesses responding to the increased consumer demands may have a more difficult time getting the right resources to easily provide more consumer goods sooner, those involved in the existing earlier stages will face a more slowly declining demand rather than a failure for expected demand to materialize as occurs in the credit expansion case.

Conclusion

In a recent study, Keeler (2001) attempts to provide historical/empirical evidence for the Austrian business cycle theory by examining the effect of interest-rate changes on various components of investment spending (classified arbitrarily as early- or late-stage investment) and consumer spending. Our analysis implies that such research is likely to be misleading. The important causal feature is not the change in observed interest rates, or even changes in interest rates relative to the natural rate, but the amount of circulation credit and whether the credit issued is initiatory, as in the benchmark case, or reactive, as in the productivity shock case and the saving decline case.[10]

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[10]We owe a thank you to an anonymous referee for suggesting the initiatory/reactive terminology as an appropriate way to describe the central bank's activity in the three cases.

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A Perilous Progress: Economists and Public Purpose in Twentieth-Century America. By Michael A. Bernstein. Princeton, N.J.: Princeton University Press, 2001.

Every economist who regards himself or herself as a free-market theorist and advocate should acquire, read, and retain this paean to planning and interventionism as a valuable reference–especially if he or she is also a political libertarian.

There are four good reasons: (1) it names names and carefully chronicles crucial events in a veritable family history of mainstream American statist economics and economists in the twentieth century; (2) it is very carefully referenced and contains extensive literature citations and a lengthy and admirable bibliography; (3) it provides a very defensive, almost stereotypical, Keynesian (in the Leijonhufud sense of the term) view of twentieth-century economic history and policy; and (4) it will provide several good laughs because of the author's naïvely worshipful attitude toward economic fascism and his ingenuity in historical interpretation. For libertarian economists, especially, the book figuratively lifts the lid of Hell for a lengthy peek inside.

Bernstein's narrative proceeds almost chronologically, beginning with the founding of the American Economic Association in 1885 and ending with the privatization initiatives of the 1990s. It is a saga that details early attempts by leading figures in the AEA to achieve political influence and the wielding of power in order to bring science to public policy. The key, as they saw it, was the "professionalization" of the American economics establishment, and then the selling of that professionalism to politicians and bureaucrats. The middle of the saga has the fully professionalized economics establishment framing and dominating policy debates, as well as constituting a template for other academic disciplines. There is an unhappy ending. In the author's words,

> it was statism and centralized economic policy practice that had brought economists and their discipline to the prominence and influence they had enjoyed through the latter half of the twentieth century. . . . Today, the withdrawal from engaged debate over the ends of national policy and the cultivation of a scholastic discourse that has increasingly separated economics and its practitioners from the arena of genuinely public decision making have become more and more widespread. This disciplinary and professional evolution, this perilous progress, has brought economics to the point of extinction. (p. 194)

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The first part of that assessment refers to developments chronicled in the first five of the six chapters of the book. The last is argued in Chapter 6.

Drawing on extensive manuscript and correspondence archives, oral histories, scholarly books and articles, and the popular press, Bernstein carefully reconstructs the early attempts by AEA figures in academia to organize and professionalize their discipline, while seeking to bring themselves and their professional skills to the attention of politicians and bureaucrats. Their initial lack of success was illustrated by the almost complete absence of any attention paid to economists' views in the creation of the Federal Reserve System in 1913. The first circumstance providing opportunities for limited progress was the outbreak of war in Europe, and the subsequent entry of the United States into that war in 1917. Cooperation between the AEA and various federal agencies provided the impetus and the authority for the AEA to initiate the classification of specializations, as well as to compile a roster of economic experts competent to work for government. Senior AEA members flowed into administrative positions, while other economists toiled away in various agencies, managing the war effort.

Following the war, the campaign shifted to the establishment of foundation-supported research establishments, such as the National Bureau for Economic Research, and the linking of those establishments with federal government statistical projects. In this regard, Herbert Hoover's Commerce Department was an important client and partner. Nevertheless (p. 60), "it was the cruel irony of history that [President] Hoover, who as commerce secretary had done more than any other cabinet officer to utilize the skills of professional economists in the work of government, would be so ill-served by the very experts he had cultivated," because not one American economist forewarned him of the impending economic catastrophe, nor were any of much help in resolving it. The policy impotence of American economists was most cruelly displayed in the passage of the Smoot-Hawley Act of 1930 in the face of public opposition to the tariff act by over one-third of the membership of the AEA.

The "political calculation and electoral manipulation" that characterized the Roosevelt administration precluded any coherent economic policy in the "New Deal," although economists flooded into government agencies. For Bernstein, the most important economic legacy of the thirties was the Keynesian framework for demand management, while the economic legacy of the "New Deal" was National Income Accounting and its subsequent application to war management and Keynesian policy making. Also, for Bernstein, it was World War II that ended the depression and provided the next great opportunity for the AEA establishment to prove the worth of economics in the policy arena. The newly available accounting tools and the allocative techniques of neoclassical economists were especially suited for planning and managing the war effort. In addition, the war period stimulated the development of the theoretical tools of activity analysis and linear programming. Later, the cold war similarly would stimulate research in game theory and mathematical simulation, and provide new opportunities for economists in the "national security state."

During the war, as it had in World War I, the AEA provided the federal government with a classification of specialties and an evaluation of credentials of economists

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to be employed in the war effort. Even further, designing appropriate educational curricula and training graduate students became a preoccupation that extended into the postwar period. It also extended into the rebuilding of Asian and European higher education in economics in an American mold, as well as aiding the American Library Association by compiling lists of recommended titles to rebuild foreign library collections. The result was a decided homogenization of curricula that excluded schools and figures that were not congruent with the mainstream's view of what would best advance economic science. Further, the passage of the Employment Act of 1946 created the Council of Economic Advisors (CEA) as a permanent aid to the formation of economic policy within the Executive Office of the President. As an influential social science, establishment economics was about to come of age.

The stage is now set for Bernstein's presentation of the apogee of the influence of economists on public policy. All the required components have been gathered together. Economists had seemingly proved their value in the management of the war effort and in postwar military education and advisement. The National Income Accounting tools were available to provide the information needed for Keynesian demand management; and, the public goal of full employment growth was widely accepted in the professional establishment. To cap it off, a lip to the ear of the president by a "credentialed elite" had been created within his own executive office. All that was needed was the right ear for the job–and John F. Kennedy was elected president in 1960.

Bernstein's macroeconomic history of the U.S. economy of the early 1960s, and the role of Kennedy's CEA in addressing it will provide a great deal of amusement to those skeptical of the myth of "Camelot." In Bernstein's narrative, there was a sluggish economy in the early 60s; the Keynesians on the CEA proposed a tax cut that meant deficit spending; a receptive and supportive president took it to Congress before his assassination; Congress subsequently passed the Revenue Act of 1964; and, lo, the unemployment rate went down and economic growth resumed. The New Economics of Kennedy's CEA had triumphed. The fact that unemployment rates were already falling by 1964 and the rate of growth of GDP had already significantly increased by 1962 would seem to detract from this picture, as would the acceleration in both federal spending and deficits that began in 1961.

Be that as it may, in Bernstein's account, the glory of the New Economics in 1965 would yield to ignominy by 1968. The salutary effects of the New Economics were masked by the "excessive" financial stimulus of the Vietnam War buildup–and this behind the backs of the CEA elite. The president and the Congress had left the CEA in the dark in the rapid buildup beginning in 1965 and their macroeconomic forecasts were way off; the formation of fiscal policy was trumped by the actual practice of government. Subsequent fiscal and monetary restraints were too little and too late to halt the "inflationary spiral," and the New Economics was discredited by its falsely perceived fruits.

The rest of Bernstein's narrative relates the demise of the faith in demand management and the rise of the Federal Reserve, as the architect of price stability, as the new grail. From policy architects of the New Frontier, CEA members and staff sank to

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the level of policy flacks for the Oval Office under Bill Clinton. Meanwhile, the economics establishment searched for a new religion as it moved away from the funeral of Keynesianism, while "rational expectations" and "supply-side economics" drove the final nails into the fiscal-policy coffin. Even worse, government itself began to be regarded as the problem and deregulation became *de rigueur*. Members of the economics establishment either allied themselves with the "business elites" in eviscerating government to the benefit of "a dessicated [sic.] market paradigm," or skulked in their academies and gazed at their mathematical belly buttons.

There are some guilty pleasures in reading Bernstein's saga, in addition to the reasons given at the beginning of this review for reading and retaining it. First, the whole story is a kind of morality play, wherein members of the American economics establishment go from policy-making "shirtsleeves to shirtsleeves in three generations," culminating in their role either as harem wife for the likes of Bill Clinton, as shills for corporate America, or as onanists of the academy. Second, it is worth the read to see the portrayal of the AEA for most of the twentieth century as a professional analogue to the Ottoman Empire. Third, one seldom finds such a refreshing treatment of the cynicism of FDR and of the tension within his administration between the planners and the trustbusters that made its economic policies so chaotic and futile.

There are a few negatives. Despite an apparent encyclopedic knowledge of twentieth-century macroeconomic and monetary theory and policy publications, there is no evidence that Bernstein has ever read a single article or book by an Austrian School author. There is not even one citation of anything by Menger, Mises, Hayek, or Rothbard–even in criticism. Because of Bernstein's central preoccupation with economic growth and cycle theory, his careful attention to twentieth-century economic history and the history of anti-cyclical economic policy, and his apparent familiarity with several standard works in the history of economic thought, one would expect him to have at least investigated all challengers to the Keynesian interpretation. It's not as if he shies away from the use of terms such as "inept," "moribund," "superficial," "ahistorical" [sic.] or "strident" to characterize the views of those with whom he disagrees. But, no Austrian School economist even rates the status of a Banquo's ghost in Bernstein's literary castle. This is a curious omission in an otherwise meticulous work of scholarship.

The second great negative is the rather obvious conflict between his general view that wartime planning and peacetime demand management illustrate the triumph of economics in the service of statism, and the embarrassing collapse of that epitome of state management–the Soviet Union. It's not as if Bernstein is unaware that the Soviet Union collapsed. He specifically refers to it in an epilogue that celebrates the similarities in the theoretical work of Tjalling Koopmans and Leonid Kantorovich that led them to share the Nobel Prize in 1975. But, this is taken by Bernstein to prove the similarities between the problems and tools of both capitalism and socialism. Following that is a sneering reference to the smugness of the triumphant West. Smug, and rightly so.

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It must also be pointed out that there is no evidence in this book that the author recognizes any substantive difference between centralized resource allocation to achieve given ends, either in wartime or peacetime, and the market process, where both means and ends are part of disaggregated decision making. But then, one of his most praising references is to J.K. Galbraith's *Economics and the Public Purpose.*

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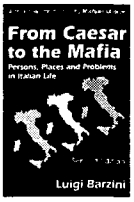

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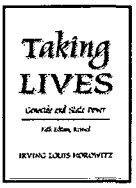

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SMARTER GROWTH: MARKET-BASED STRATEGIES FOR LAND-USE PLANNING IN THE 21ST CENTURY. EDITED BY RANDALL G. HOLCOMBE AND SAMUEL R. STALEY. WESTPORT, CONN.: GREENWOOD PUBLISHING, 2001.

Readers of this journal probably are aware that the push for "smart-growth" development policies typically is accompanied by half-baked assertions, arguments from intimidation, and—shall we say—strategic creativity in interpreting events. Which makes it a standard modern cry for bigger government. The contributors to Holcombe and Staley's volume of essays—all of whom are authorities on the topics of their contributions—would like to rain on this parade by doing something its marchers rarely do: stating facts, repeatedly, and with extensive citations. While the advocates of anti-sprawl policies are unlikely to heed their efforts, those interested in presenting to the world a more helpful (and hopeful) vision of land development will find their compendium a valuable source of *anti-* anti-sprawl factual slam-dunks.

You want facts? Here are a few, dipping randomly into the volume's ample riches.

- *Is there a sprawl crisis?* Only about 5.4 percent of U.S. total surface area is developed (p. 15), and the data suggesting a recent rapid pickup in the rate of development are flawed, sharply biasing growth estimates upward (pp. 19-22). Sprawl in most U.S. cities is sharply decelerating, and in some is actually decreasing, due primarily to market forces (pp. 166-70).

- *Is sprawl gobbling up precious cropland?* The bulk of the cropland decline is explained by soaring productivity in the agricultural sector (pp. 17-18), not by development.

- *Is conventional wisdom about population densities correct?* Are trends unique to America? "Smart-growth" advocates promote policies that seek higher urban population densities. But the two cities condemned most by the movement—Los Angeles and Miami—actually were America's two highest-density urban centers in 1990 (pp. 32, 160). Meanwhile, the "smart-growth" movement's inspiration—New York City—continues a long-term decline in measured densities as its suburbs expand (p. 32). Internationally, suburbanization and auto use in Europe and Japan are similar to U.S. patterns, despite policies there that aggressively favor compact development (pp. 32, 161-66). Far from being distinctly American, auto-love and suburbanization are worldwide concomitants of prosperity.

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- *Has traffic congestion worsened?* Do new roads help? Most U.S. suburbanites do not have long commutes, partly since suburb-to-suburb commutes are replacing suburb-to-central-city commutes as job dispersion increases (pp. 39, 43-44). Nationwide, trip-time changes have been minor since 1980, and average U.S. highway speeds are rising, not falling (p. 43). Aggressive highway construction clearly eases congestion (studies finding to the contrary have ignored–among other things–how new freeway construction eases congestion on secondary roads) (p. 226). And traffic is much worse in Europe and Japan, due in part to the widespread adoption there of the policies advocated by the "smart-growth" movement (pp. 29-30).

- *Is mass transit the solution to congestion?* Less than 2 percent of all person-trips are via mass transit (p. 47). Even a heroic doubling of mass transit's market share still would account for less than 10 percent of commuters (p. 5). Calculated correctly, mass transit costs-per-rider in many cities are not even competitive with limousines (p. 49). Mass transit is spurned by most of those poor who "smart-growth" advocates claim to be helping (p. 53).

And there is much more along these lines. *Smarter Growth* is thus a valuable reference volume which lays out many of the facts–with citations–that give the lie to the "smart-growth" movement's claim to a credible basis for its policies. But the book is more–far more. Meticulously interwoven through the volume are three basic themes. First (as described above) is a careful dissection of the basic facts which "smart-growth" advocates claim justify their movement. Second is theoretical critique: What basic economic and social premises are shared by this movement, and how plausible are these premises? Complementing these first two essentially critical themes is a third constructive one: What are the market-based alternatives to "smart-growth" policies, and how strong is the case for such alternatives?

Austrian readers will appreciate the consistency with which the various authors use the central insights of Mises and Hayek as a basis for arguments. Holcombe and Staley (Chaps. 1 and 14), Holcombe (Chap. 8), Staley (Chaps. 2 and 11), and Meiners and Morriss (Chap. 10), among others, give careful attention to the daunting information problem that land-use regulators face when seeking to craft policies of benefit to society. "Smart-growth" advocates prefer to assume that the planner's problem is simple and easily solved. The four authors mentioned above convincingly demonstrate the contrary. It is interesting to discover that most urban planners refuse to think of what they do as central planning–a contention that Holcombe makes short work of by pointing out the closeness of Florida's statewide planning to the old Soviet model.

The insights of Mises and Hayek regarding central planning inspire a number of market-based proposals which address the "smart-growth" agenda. Staley (Chap. 2) and Holcombe (Chap. 8) emphasize how the public sector, just by determining and announcing far in advance where new roads will go, would convey information to the private sector that would promote an efficient pattern of land usage through a market-based discovery process. Mildner (Chap. 7) explains how the inefficiency of one big regional government versus many small local governments is based in part on the Tiebout insight that people voting with their feet can use their own private, dispersed information to make informed choices. Meiners and Morriss (Chap. 10) emphasize how "smart-growth" recommendations such as greenbelts and setbacks cannot be

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valued by polls or other alleged information sources that do not confront the polled with questions about how many goods they are willing to give up in exchange for these environmental assets. Only a market-based discovery process can properly value such assets. These same authors argue for the superiority of the common law over administrative (environmental) law, due to the former's status as law which works within a framework that protects private property rights. Thus, such law promotes market-based institutions which make more efficient use of information than centrally planned environmental law. Staley (Chap. 11) also emphasizes such information-based arguments, in which "the market works as an iterative process, revealing new information with each transaction" (p. 215). Similar arguments are common throughout the book. It is pleasing indeed to see the "smart-growthers" meet Mises and Hayek at last on the open field of battle and be routed.

That other bane of planning enthusiasts everywhere–the public-choice perspective with its powerful rent-seeking insight–also is well represented in the volume. "Smart-growth" advocates consistently manage not to see that many of their policies provide a happy playground for fast-moving self-serving special interests. The authors of *Smarter Growth* emphasize just such tendencies–and thereby tear away the wizard's curtain hiding the true nature of many anti-sprawler "policy proposals." Some examples: Edgens in Chapter 6 discusses the EPA's emphasis on "nonpoint source water pollution" (water pollution stemming from too many sources to pin down). Edgens shows that the EPA's "concern" is at least as much a strategy for winning very broad, new regulatory power over land development as it is an attempt to attack environmental problems. Mildner in Chapter 7 points out that Portland's "urban growth boundary" is quite interpretable as a strategy by which homeowners inside the boundary "work with" local authorities to assure continued appreciation in their property values by halting development just outside the boundary. Various planners' initiatives that claim to combat sprawl by revitalizing the central city in fact have as their primary effect (and purpose?) the enhancement of careers of urban politicians (Chap. 13). The relentless hammering-home of the rent-seeking insight adds up to a devastating critique of the urban planner's mindset, in numerous specific contexts.

As their volume's title suggests, the authors also put forth alternative market-based policy proposals to address the legitimate concerns of the "smart-growth" movement. The Left, spurred on by deeply-rooted Marxist premises, see market forces as devices through which the rich and powerful *bourgeoisie* exploit and afflict the helpless *proletariat*. Not surprisingly, they admit little social value to markets, and ceaselessly advocate government-sponsored substitutes. The authors of *Smarter Growth*, by contrast, recognize the central insight of economic theory–that market forces represent the distilled decisions of millions of decentralized decision makers. These forces, therefore, reflect a dispersed knowledge of preferences that cannot be uncovered through any other social device. Effective public policy must retain access to this vital information by keeping a market-based structure to policy. This general perspective leads to a number of interesting policy proposals (several are discussed below).

The book's origins are of interest. The editors organized a conference bringing distinguished proponents of market-based development together with advocates and practitioners of "smart-growth" policies. The market-based scholars gave the papers, the "smart-growth" advocates commented, and this commentary was considered when revising the papers that became *Smarter Growth*. The criticisms are not included in the volume–doubtless due to space constraints–and it would be nice to have access to them (perhaps via the internet?). Still, there is validity in the editors' claim that

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advocates of "smart growth," whose perspective dominates both mainstream media and academia, need not also present their positions in this book.

The editors' initiative has brought together 14 chapters–and 265 densely-printed pages–devoted to presenting the market-based alternative perspective to the "smart-growth" position. Chapter 1 is a competent introduction by the editors presenting the volume's main themes. Chapter 2, by Samuel Staley, is a useful overview of U.S. development and land-use trends. Staley presents compelling arguments that there is no "development crisis." The loss of farmland to sprawl is small compared to other causes, such as conversion to pasture. New development's impact outside urban zones is muted by undeveloped land within metropolitan areas. Lot sizes in new suburban developments are not getting larger (though houses are getting larger by getting taller). Staley's chapter also has a trait that appears often in the volume: Summaries of pertinent data are presented, described, and woven nicely into the narrative.

Chapter 3, by Peter Gordon and Harry Richardson, looks at the relationship between sprawl and the automobile. Is the auto the cause of sprawl? (No, suburbanization began well before the auto era.) Is there impending gridlock on America's roads? (No, the flexibility of land markets is keeping commuting times roughly stable.) Are conditions worse in the auto-loving U.S.? (On the contrary, conditions here are far better than those in European and Japanese cities that seek to reign in sprawl.) Is auto-induced sprawl causing "spatial mismatch" between the poors' residences and their jobs? (The empirical evidence for such a view is unconvincing, and moreover, much anti-sprawl policy discriminates directly against the poor, by making used cars more expensive and by promoting types of mass transit that favor the well-off, not the poor.) Gordon and Richardson effectively defend suburbanization as efficient and welfare-enhancing, against the "smart-growth" position that it is a market failure.

Chapter 4, by Robert Poole, is the first of several chapters emphasizing market-based policy. Poole puts forth the case for road pricing and market-supplied roads as a solution to traffic congestion. The ability of fast scanners to read stickers and even license plates marks the end of the argument that limited-access highways suffer from a free-rider problem. They are now more like a public utility, and they should be so treated (an argument echoed by Wendell Cox in Chapter 12). Poole provides a useful summary of the evidence favoring this position–including discussion of working private roads in existence around the world–and discusses the political issues impeding its widespread adoption as well as possible solutions to these impediments. He also describes pricing schemes that would improve the existing public-supply system (peak-load pricing, and pay-as-you-go commuter lanes in freeways accessible to all payers, as opposed to the current system of free lanes that permit only cars containing at least two people).

Chapter 5, by Kenneth Green, addresses the environmental consequences of sprawl on air, water, and soil. Sprawl's environmental menace seems quite exaggerated. Evidence that air quality is adversely affected by population density is ambiguous at best, as Green shows by comparing the standard EPA data interpretation with an alternative interpretation that focuses on those metropolitan areas which offer the highest-quality data. The link between density and soil contamination is also problematic, due to the absence of data that speak unambiguously to this question. Finally, there is evidence of a connection between water quality and density. However, this is due not to the effects of density in general, but instead to the fact that more densely populated areas have more "impervious surfacing" (e.g., asphalt parking lots). This last suggests a problem not with density *per se*, but rather with one

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specific issue that should be manageable without the massive assault on development pushed by "smart-growth" advocates.

Jefferson Edgen's Chapter 6, on the EPA's attempt to establish itself as a *de facto* national land-use planning agency, will send a chill down the spine of every lover of freedom. If the EPA openly asserted its intent to actively control the use of most land in the developed areas of the U.S., it would encounter ferocious political opposition—particularly from local governments, which have had authority over local development standards. But when the EPA moves to accomplish the same thing by claiming a need to aggressively regulate "nonpoint source water pollution" (pollution coming from many small sources), there is little opposition, nor even awareness by the general public that such regulation amounts to substantially the same thing. From the EPA's perspective, the charm of "nonpoint source water pollution" is that its threat can be painted as injuring broad areas in many local jurisdictions. Thus, the case for federal (i.e., EPA) oversight is more easily made. Edgens gives the reader the book on the EPA, explaining the mechanisms through which it expands its authority to the limits—and well beyond the limits—of reasonable legal interpretation. If you are a land developer, you can hardly draw a breath these days without first considering the views of the EPA. Edgens's contribution helps explain how this state of affairs came to be. It is a sobering tale.

Chapter 7, by Gerard Mildner, discusses a current fad known as regional government—a fad built on the premise that land-use regulation will work fine if the area under the authority of a sole regulator becomes big enough. Such a perspective provides yet more grist for the Mises-Hayek critique-of-central-planning mill. It is also the first of several chapters that engage "smart-growth" advocates on (so to speak) their home turf—Portland, Oregon. Mildner lays out the mechanics of the Portland land-regulation system as well as the disturbing side effects of the experiment there with urban growth boundaries. These include: sharply escalating land and housing prices, a shortage of lower-income housing, dramatic declines in individual freedom to manage one's own land, a lack of demand for the very small residential lots mandated by the planners (thus contributing to tight land markets by effectively taking this land off the market), the encouragement of "leapfrog development" as people settle in more distant communities outside the greenbelt, and other effects. In addition, there are shorter treatments of policies in Minneapolis-St. Paul and in the six states that have comprehensive growth-management policies in place. This fact-packed chapter lays out some of the ugly underside of the "smart-growth" movement (e.g., the *de facto* discrimination against the poor in housing markets via policy-inflated prices; the fact that land just inside Portland's urban growth boundary sells for six times what land just outside the boundary sells for).

Randall Holcombe's Chapter 8 is on growth management in Florida. In the Sunshine State, sentiments that began with an urge to "save the Everglades" and slow down the pace of development have morphed into comprehensive statewide planning, with broad-based veto powers over local development plans. Holcombe describes Florida's system, taking the reader through "concurrency," the 120-percent rule, and other bureaucratic page-turners. He points out how problems defining sprawl have given regulators very broad discretion in approving or rejecting local government growth plans, a condition that makes it hard for local governments to know how to prepare these plans in the first place. This chapter complements Edgens's on the EPA, showing again how full-scale central planning can evolve out of initially limited growth-management policies. Holcombe's contribution also provides constructive

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market-based alternatives to the "smart-growth" policy mix. As is true elsewhere, Florida's recent "contribution" to road planning has mainly been to reduce funding for road construction. Since consumers like their cars, more roads—not white elephant mass-transit systems—should be built. And when roads are built, they should be planned well in advance and the planning should be announced, so that private-sector construction can take these plans into account. Therefore, private-sector projects built in the road's orbit will be more efficient, leading to far fewer congestion problems. Further, when new roads are planned, space for eventual widening should be secured at the outset, not piecemeal as growth occurs. In general, planning of public resources should be over long periods and the plans should be widely known, so that the private sector can take these parameters into account.

Chapter 9 looks at urban density and sprawl from a historical perspective. Robert Bruegmann notes that the one factor that is part of everyone's definition of sprawl is lower urban densities (anti-sprawl activists seek relentlessly to raise these densities). Conventional wisdom holds that lower urban densities are a recent, predominantly American, phenomenon, implying the density "problem" can be fixed by changes in the U.S. policy mix. Bruegmann systematically demolishes this starting point for the anti-sprawl movement. Forces leading to lower densities are deep-rooted and universal, reflecting strong preferences of citizens worldwide. It has been going on since the nineteenth century (well before the automobile, the favorite culprit in "smart-growth" dogma). Development patterns in, say, Chicago and Paris are far more similar than conventional wisdom admits, as a detailed comparison in the chapter reveals. Bruegmann points out the irony that early twentieth-century urban scholars spent much effort trying to figure out how to *lower* urban densities and promote suburbanization, whereas today, chic opinion seeks precisely the opposite result. It is not the first time that one generation's urban nostrum has become the next's policy disaster (a point developed further by Steven Hayward in Chapter 13). Bruegmann also addresses the notion that land use per-capita is increasing in the U.S. There is little evidence to support this article of faith among anti-sprawl advocates. If anything can be gleamed from the data, it is that the rate of suburbanization in cities such as Chicago is slowing down.

No consideration of private property in America would be complete without first checking in with the good folks in Bozeman, Montana. Roger Meiners and Andrew Morriss of the Political Economy Research Center deliver a tenth chapter that lays bare the theoretical flaws at the core of the "smart-growth" movement and defines the legal theory of a market-based alternative. The "smart-growth" agenda is little more than central planning "with a green tint": Why should central planning be successful addressing a matter as complex as land-use planning when it already has failed dismally in a relatively simple task such as supplying bread to the Soviet population? Meiners and Morriss identify the "smart-growth" movement with broader legal trends under which centuries-old legal traditions based on common-law property rights have been replaced with coercion-based statutory and administrative law. There are costs to freedom when a society replaces institutions enhancing the voluntary resolution of differences with regulatory and administrative *diktat*. This is chillingly brought home by stories of those who have challenged the regulatory state, only to find themselves broken on a wheel of endless red tape and bureaucratic zeal. However, the greatest value of Meiners and Morriss's chapter is that it lays out the outlines of what market-based policy concerning land-use issues would look like. Using the well-trodden metaphor of property (common) law as "a bundle of sticks," the authors explain how

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such a strategy for solving problems of property law works. By recognizing that the various "sticks" can be separated and sold or leased separately as real covenants, easements, and other legal devices, a plausible alternative to regulatory intervention is put forward. Meiners and Morriss hold to a vision of a free-market world where much or most land value would be partitioned among several owners, much as mineral rights for land rich in natural resources often are owned separately from the remaining rights (e.g., the right to build a house). They close with illustrative examples taken from the free-market environmentalism literature. Meiners and Morriss's vision would seem to hold substantial promise, not just as a basis for a market-based policy alternative to that of the "smart-growth" movement, but as a starting point for a free-market approach to urban economics in general.

Chapter 11, a second contribution by Samuel Staley, is a thorough examination of the basic premises at the foundation of the "smart-growth" movement. Under a "smart-growth" policy regime, how are planners to know what to do? Through citizen participation in the process? Which citizens? What about those who don't participate, or who are not yet on the scene? What happens when opinions change faster than the election cycle? Government bureaucracy works best when goals are clear—what are the goals of the "smart-growth" movement? Far from being clear, goals are remarkably diverse and sometimes contradictory, and change often. Is needed technical information available to government officials making the decisions? Hardly: needed information is dispersed among many individuals with unrevealed preferences. Staley points out that the types of problems posed by land-use planning are precisely those where—if societal well-being is the objective—market-based solutions utterly dominate command-based solutions. For these types of problems, goals are diffuse (they differ sharply among individuals), there are many different competing objectives, there is significant uncertainty about people's values and preferences, and information and knowledge about the problems and their possible solutions is highly dispersed. Staley interprets the "smart-growth" policies of several states and regions—but with emphasis on Portland, Oregon—from the standpoint of his theoretical critiques. This engaging chapter lays out in an especially clear manner how utopian "smart-growth" assumptions about human nature and society are.

One of the favorite claims of the anti-sprawlers is that suburban infrastructure costs too much and is subsidized by urban residents, so that sprawl, in effect, is an unjust tax on earth-friendly city dwellers by callous, land-gobbling suburbanites. Wendell Cox's Chapter 12, on "Infrastructure Provision in a Market-Oriented Framework," is a thorough demolition of the notion that urban communities are victimized by suburbanites. Costs of infrastructure are not higher in the suburbs: In fact, extensive retrofitting is needed to add infrastructure to already crowded urban areas, which is far more expensive than supplying undeveloped areas with the same services. This is *before* factoring in the rent-seeking activities for which urban authorities are legendary. Cox also decisively refutes one of the favorite bromides of the anti-sprawlers: the notion that building more highways is futile, since traffic grows to swamp whatever new capacity is produced. In fact, the evidence is sharply to the contrary; further, studies commonly cited to support the highways-cause-congestion notion suffer from blatant, fatal flaws. Finally, Cox gives market-based prescriptions for solving urban and suburban infrastructure problems, emphasizing competitive bidding and franchising of infrastructure. "De-politicizing" infrastructure cuts costs, due not only to the private sector's attention to the bottom line, but also to the cutting out of urban

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rent-seekers, who traditionally have prospered at public expense via their stranglehold on city infrastructure projects.

Speaking of cities, Steven Hayward's Chapter 13, on "Fixing the Dysfunctional Central City," is an unlucky chapter indeed for urban theorists that fellow-travel with "smart-growth" activists. Hayward instructively runs through the litany of policy nostrums that have been pushed by different generations of urban reformers. Urban renewal, the "Model Cities" program, the "Edifice Complex" ("if we build urban monoliths, middle-class suburbanites will come [back]"), regional governments, stadiums and other high-profile revitalization efforts, enterprise tax zones (which he insightfully calls the conservative equivalent of a sports stadium or convention center): All have been pushed in their day as "the" solution to urban woes, and all fail to address the deep structural problems that characterize struggling American urban cores. These problems include not just high taxes, punishing regulations, and government-protected monopolies, but the more fundamental issue that the urban lifestyle is simply not what the average American desires. True urban revitalization must await the political will to tackle deep structural reform of government's role in urban affairs, an unlikely scenario in the near future. Meanwhile, Hayward urges common sense. Why do most parents leave the cities as soon as they can afford to do so? Crime (the urban core's steepest marginal tax) and dysfunctional public education drive more families to the suburbs than the chance to (as sneeringly portrayed by anti-sprawlers) live in a big house in a bigger yard enclosed by a white picket fence. School choice programs—not stadiums and "garden neighborhoods"—would keep more families in the city. Following Hayward's chapter, the editors close out the volume with a useful summary chapter.

Taken as a whole, *Smarter Growth* is a comprehensive engagement of the "smart-growth" movement across the entire spectrum of that movement's urban, suburban and regional policy recommendations. In addition, the very extensive list of references will be useful to anyone interested in quickly getting up to speed on any of the policy issues discussed in the book. Lovers of freedom have long been aware of the Left's growing determination to micromanage land use, a lust for control which is a fundamental threat to liberty in the U.S. (and elsewhere). *Smarter Growth*, in a single volume, identifies, critiques, and offers plausible market-based alternatives to the "smart-growth" movement. It is valuable to the general public-policy student and the urban specialist alike.

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Ethics as Social Science: The Moral Philosophy of Social Cooperation. By Leland B. Yeager. Cheltenham, U.K. and Northhampton, Mass.: Edward Elgar, 2001.

Like feuding relatives at a family barbecue, economists and moral philosophers often like to pretend they have nothing to do with each other. Economists pose as value-neutral scientists who have no need for airy-fairy moral theory; yet they regularly dispense the sorts of prescription and advice that cry out for ethical analysis. Philosophers likewise view themselves as having loftier concerns than vulgar economics; but by conducting their ethical and political theorizing in ignorance of economic principles, they are unable to avoid recommending policies that would be unworkable or disastrous in practice. This, at any rate, is how Leland Yeager sees the situation, and it is hard to disagree with him; ethics and economics need to learn from one another.

But what is it, precisely, that needs to be learned? Here Yeager's answer is more controversial; he defends what might be called Austro-utilitarianism (the term is mine, not his), i.e., a version of utilitarianism informed by the concerns of the Austrian School and squarely in the tradition of Mises, Hazlitt, and Hayek, with a particular emphasis on the conditions for successful social cooperation.

Yeager defines utilitarianism as "a doctrine whose test of ethical precepts, character traits, legal and economic systems, and other institutions, practices, and policies is conduciveness to the success of individuals as they strive to make good lives for themselves in their own diverse ways" (p. 13). This definition is neutral–I suspect deliberately so–between universalistic and egoistic versions of utilitarianism, and Yeager cites universalist John Stuart Mill and egoist Ayn Rand with equal approval (though he is unimpressed by the transcendental arguments Mill and Rand offer for their respective principles as presuppositions of value in general). Universalistic utilitarianism's ethical criterion is the welfare of society as a whole; egoistic utilitarianism's ethical criterion is the individual agent's own welfare.[1] For Yeager, however, the universalist and egoist formulations are equivalent in practice, since the same principles of conduct serve the long-term interests of both individual and society: society fares better if individuals give priority to their own interests, and individuals' lives fare

[1]The term "utilitarianism" is sometimes restricted to the universalist version only, but I here follow Yeager in applying the term more broadly.

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better if they cultivate benevolence as one of those interests. (Even if the two standards generally coincide, one still wants to ask which one is *really* correct; but Yeager seems impatient with such questions. Chapter 8 might be read, however, as suggesting that his sympathies have been shifting toward egoism.)

Yeager believes that contemporary moral philosophy is largely a "parade ground of intuitions, revelations, and bombast" (p. 1), a condition that can be cured by basing ethics on the testable, verifiable results of social science. Yeager is particularly skeptical of the philosophically dominant method of "reflective equilibrium," at least as it is used by critics of utilitarianism. This method proceeds by starting with all the moral judgments one initially finds intuitively compelling, and then working through mutual adjustment to reach a maximally coherent belief system—sometimes revising judgments about general principles to fit judgments about particular cases, sometimes revising judgments about particular cases to fit judgments about general principles. Practitioners of this method often end up rejecting utilitarianism on the grounds that it would license, at least in some circumstances, conduct that intuitively seems immoral.

To Yeager, revising general principles to ensure or avoid specific verdicts in particular cases illegitimately treats mere intuitions as "analogues of scientifically observed facts to which an acceptable theory must simply accommodate itself" (p. 34) when they are just as likely to be "mere prejudices" (p. 199). Yeager regards such intuitions—and thus the achievement of coherence among such intuitions—as of no scientific value *per se*, since he endorses the Humean (and Misesian) view that ultimate judgments of value are rationally arbitrary and not subject to proof or disproof.

Rather than despairing of the prospects for a scientific ethics, however, Yeager proposes to narrow the scope of ultimate value judgments to the uncontroversial premise that happiness is preferable to misery, thus allowing the *rest* of ethics to be a respectably scientific, empirical affair of determining which practices are in fact conducive to happiness. While recognizing that there are different conceptions of happiness (preference satisfaction, subjective pleasure, objective flourishing), Yeager regards deciding among them as a matter of little urgency, since on just about any plausible conception, happiness will depend heavily on the individual's ability to coordinate her actions with the actions of others, and so the best way to promote happiness is to foster the social conditions for such coordination. Social science then gives content to ethics by determining empirically which principles of conduct are in fact most likely to foster those conditions. (Unlike Mises, Yeager appears to regard social science as a purely empirical enterprise.[2]) Such happiness-promoting principles of conduct will be relatively invariant across different conceptions of *what* happiness is and *whose* happiness should be promoted.

While Yeager denies the objective validity of normative judgments, he is no longer, he tells us, a proponent of the emotive theory of ethics associated with logical positivism (pp. 19-33, 204-05). According to that theory, a sentence like "bombing civilians is immoral" really means something like "bombing civilians? yuck!"—that is, while having the *form* of an assertion of fact, it is really the expression of an attitude and so is not open to rational assessment. On Yeager's view, the emotive theory

[2]Yeager has suggested in other works (Yeager 1994, 1997a, 1997b) that economic axioms, far from being *a priori* in the Misesian sense, can all be sorted into "inescapably obvious" empirical facts on the one hand and "useful tautologies" on the other.

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confuses *fundamental* normative judgments, which are indeed rationally arbitrary, with derivative applications of those judgments. *Given* a background assumption like "what promotes happiness is right and what hinders it is wrong," a specific judgment like "bombing civilians is immoral" implies the testable proposition that a policy of bombing civilians will tend to frustrate happiness—both one's own and that of society generally. Yeager's criticism of nonutilitarian moral theories is precisely that by increasing the number of normative judgments that must be taken as fundamental rather than derivative, such theories thereby decrease the range of ethical questions that are open to empirical assessment.

Yeager's own empirical assessment yields the conclusion that the conditions of social cooperation, and so of happiness, are best served by, *inter alia*, "secure property rights, a free-market economy, and a government of limited powers" (p. 274)—in short, a libertarian social order. He is critical, however, of such rival libertarian thinkers as Murray Rothbard, Robert Nozick, Walter Block, and George Smith, whose theories are faulted both for their radicalism (Yeager's own libertarianism is fairly moderate—endorsing, e.g., the legitimacy of taxation and the coercive state, p. 284) and for their nonutilitarian foundations.

Yeager's theory is a version of *indirect* utilitarianism; the most reliable way to promote happiness—or social cooperation for that matter—is not, he argues, to aim at such a goal directly in all one's actions. Utilitarian goals are best pursued indirectly, by committing oneself to certain rules, institutions, and character traits. Hence arises the temptation to believe that morality is valuable for its own sake rather than for its consequences. Morality's value is in fact purely instrumental—a means to promoting a further end—but we will tend to secure better consequences in the long run by acting *as if* morality had intrinsic value in its own right. Prevailing moral ideals persist because they tend, in large part, to have beneficial consequences, and so have been reinforced by both biological and cultural evolution; hence our moral intuitions, far from constituting an external check on utilitarian considerations, are themselves the product of processes that selected for utility, and indeed are open to further refinement by conscious intention in the light of empirical evidence concerning their causal tendencies. Invoking indirect utilitarianism allows Yeager to dismiss the common charge that utilitarians are committed to doing whatever will maximize utility, including—given sufficiently unusual circumstances—the torture of innocent people and the like; on the contrary, things will "work out better on the whole," Yeager tells us, if agents "internalize an almost absolute prohibition on inflicting torture" (p. 147).

Yet if the conduct recommended by our moral intuitions promotes happiness only indirectly and for the most part, what *are* we to say about those exceptional cases when one could bring about still more happiness by violating some moral principle in order to promote happiness directly? Which is the right thing to do—abide by the rule, or promote utility? Yeager objects to the use of such "cooked-up cases" (p. 12) as unrealistic and "unlikely to arise" (p. 147). One reason for their scarcity is that the tendency of even a single rule-violation to undermine the agent's own generally-beneficial character traits must be taken into account. And even if the cost-benefit balance still turned out to favor breaking the rule, an agent who has inculcated virtuous habits in herself is unlikely to notice this: the sort of person who is "alert to such an opportunity" has a character trait that will tend in the long run to "impair the individual's relations with others and impair his chances for a good life generally" (p. 167). And if a person who is virtuous overall nevertheless, through some fluke, happens to notice this opportunity, and accordingly feels obligated to violate the moral rule for

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utilitarian reasons, "the critic in the ivory tower would be presumptuous to moralize against his choice" (p. 148), since we have no grounds, apart from mere intuition-mongering, for any conviction as to which value should take precedence.

Yeager's book makes an impressive case for an attractive Austro-utilitarian version of consequentialist moral theory, and replies convincingly to a number of common objections to and misunderstandings of utilitarianism in general. Nevertheless, I am inclined to resist his conclusions. Let me say why.

Most of the disagreements between Yeager and myself can be traced to one fundamental divergence: our differing appraisals of the scientific value of reflective equilibrium as a method of inquiry. Yeager sees this method as having a more limited applicability than I do. More precisely, he is happy to endorse reflective equilibrium when judgments about specific cases are revised to fit general principles, but *not vice versa* (p. 34); in the latter case, the number of normative judgments treated as fundamental, and so immune to rational assessment, is too great. Here I would maintain, however, that because the reflective-equilibrium method is itself a form of rational assessment, any normative judgment ("fundamental" or otherwise) that is left standing after the application of the method *has thereby received, and survived, rational assessment*–and so can no longer be described as arbitrary or untestable. What distinguishes reflective equilibrium from mere "intuition-mongering" is that while it may *start* with intuitions, those intuitions are not accepted uncritically, but are instead tested against other intuitions; the cognitive value of intuitions lies not in the intuitions themselves but in the *use* that is then made of them. To borrow an analogy from Susan Haack, intellectual inquiry is like a crossword puzzle (Haack 1995): one starts with answers that initially seem plausible, but every answer is subject to revision in the light of other answers; by the time the puzzle is completed, it is quite possible that none (or some, or all) of the original answers will have escaped revision.

Yeager would object, I suspect, that merely testing intuitions against other intuitions is a meager form of rational assessment; the judgments that count, objectively speaking, are those that can be tested against empirical evidence. But I find the contrast uncompelling. As W.V. Quine reminds us, no scientific proposition can be empirically falsified *in isolation*. Empirical tests falsify only *conjunctions* of beliefs, and cannot tell us *which* conjunct(s) to reject; *that* decision requires the inquirer to make judgments of relative plausibility and overall coherence, i.e., to apply the reflective-equilibrium method (Quine 1951). An empirical test simply introduces a new belief–and thus a new potential for inconsistency–into one's overall system of beliefs; in short, empirical data constitute an exogenous shock to the inquirer's belief set. Like any exogenous shock, such data are a disequilibrating factor, which ordinarily triggers a self-correcting mechanism to move the system back toward equilibrium. In the course of adapting itself to the new belief, the mind may adjust or eliminate older beliefs that conflict with it. (Sometimes, however, it is quite properly the empirical "data" themselves that get rejected, as occurs in the case of experimental results that cannot be replicated. Hence in a sense there are no "data"; no facts are simply *given* to us in such a way as to exempt us from the responsibility to assess them critically.)

The mind's self-correcting mechanism does not operate automatically or uniformly. The process of intellectual inquiry is an *entrepreneurial* one, requiring alertness–not only to novel information but also to the previously unnoticed implications of information one already possesses. Just as the ordinary entrepreneur moves the economy toward equilibrium by discovering and correcting asymmetries of information within the market, so the auto-entrepreneur (to coin an ungainly phrase) moves

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herself toward reflective equilibrium by identifying unresolved tensions within her own belief set—unexploited opportunities for intellectual profit, we might say—and seeking to resolve them.[3] Bringing Hayek's metaphor home to roost, we might call this "discovery as a discovery process." For familiar Austrian reasons, complete reflective equilibrium is of course never achieved—first, because inquiry is costly, and in any case we never have the time or ingenuity to trace out all the implications of our beliefs and so uncover every hidden conflict; second, because new experiences are constantly introducing novel information into the belief set, compelling the process of reflection to chase a new equilibrium. Hence a better name for the method of reflective equilibrium would be "reflective *equilibration*"; an evenly-rotating mind is as much an artificial construct as an evenly-rotating economy.[4]

Reflective equilibration, as I've described it, is in tension with empiricism, since empiricism by definition grants empirical data a privileged status, while reflective equilibration throws them in on a level with everything else. Yeager's own commitment to a certain kind of empiricism is manifest in his distinction among different types of propositions, a distinction crucial to his defense of utilitarianism. In the first place he divides propositions into positive and normative; positive propositions are in turn subdivided into logical and factual. Logical propositions can be established by conceptual or linguistic analysis; factual propositions, by empirical testing. Normative propositions cannot be established in either of these ways (pp. 17-18). Yeager likewise divides normative propositions into specific and fundamental. A specific normative judgment is justified by showing it to be supported by a fundamental normative judgment; a fundamental normative judgment itself cannot be justified, but depends instead on an arbitrary subjective commitment to some ultimate value (pp. 28-31). This four-way division represents a familiar philosophic perspective, inaugurated by David Hume and reaching its peak of popularity during the reign of logical positivism. (While the position enjoys far less favor among philosophers today, it still attracts a sizeable following.) But the four-way division is open to challenge.

Yeager notes, correctly, that positive claims have a bearing on normative ones because "ought presupposes can" (p. 17). But what is the status of the "ought presupposes can" principle? It is clearly a normative proposition; but is it fundamental or specific? Not fundamental, since it clearly isn't arbitrary; not specific, since it doesn't seem to depend on any more fundamental value. It seems much more like a conceptual truth. But that would make it a logical proposition, contradicting Yeager's claim that all logical propositions are positive.

For that matter, what is the status of the very claim that normative propositions are not objective? If this claim is normative, it is either fundamental (and therefore arbitrary, so why should we accept it?) or specific—in which case it is justified (but how?) by some other value or values (but which?). If the claim is positive, it is either logical (yet its denial seems to involve no contradiction) or factual (but what could count as empirical evidence for it?).

A proposition is factual if its truth can be determined empirically; but, in light of the Quinean point discussed above, to speak of a proposition as empirically testable

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[3]In addition to manifesting Kirznerian *alertness*, the auto-entrepreneur also bears Misesian *risk*; her time-consuming reflective activity might reach the wrong solutions, or no solutions.

[4]For a fuller defense of reflective equilibration, cf. Long 1997 and 2000.

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is to say no more than that the proposition is subject to revision as a result of a process of reflective equilibration arising from an exogenous empirical shock. By that criterion, normative judgments too are factual propositions. Yet an equally good case can be made for regarding them as logical. A proposition is logical if its truth can be determined by appeal to the meanings of words; but what a word means is ultimately determined by how competent speakers are disposed to use it. However plausible we may initially find the proposition that every unmarried male is a bachelor, we will probably retract our endorsement once we recall that the class of unmarried males includes Popes, infants, and nonhuman animals; and the fact that we are so disposed is part of what determines what the word "bachelor" means and has meant all along. But if the meaning of a term depends on how judgments employing that term would be revised upon reflection, then the deliverances of reflective equilibration represent an unpacking of the term's meaning and so are logical propositions. All this suggests that a mutually exclusive division of propositions into normative, factual, and logical categories cannot be sustained.

Yeager endorses the Humean doctrine that it is impossible to derive normative conclusions from positive premises (pp. 17-19). He recognizes, however, that this doctrine is not strictly true, since, e.g., "2 + 2 = 4" logically entails "Either 2 + 2 = 4 or Smith ought to pay Jones $5.00." But Yeager objects that this counterexample, while containing a normative *term*, expresses no normative *judgment*, because it is not incompatible with any contrary normative judgment (p. 25). Perhaps not; but the example can easily be cleaned up: "Smith pays Jones $5.00" logically entails "Either it is morally permissible for Smith to pay Jones $5.00 or Smith does something morally impermissible"–and *that* conclusion is not normatively vacuous, since it is incompatible with the (empirically falsifiable) judgment "It is morally impermissible for Smith to pay Jones $5.00, and Smith never does anything morally impermissible."

According to Yeager, as we've seen, an ultimate end cannot be rationally assessed; only a means can (pp. 29-30). Hence utilitarianism, by treating all values other than happiness as means rather than ultimate ends, maximizes the range of values that are open to rational assessment. But first, even ultimate ends can be assessed by the standard of coherence (both internal coherence and coherence with other ends). And second, even if only means could be rationally assessed, the superiority of utilitarianism still would not follow.

Yeager seems to make the crucial assumption that a means must always be an *instrumental* means, i.e., that if X is a means to Y, then X makes a *causal* contribution to Y. Yet this ignores other sorts of means-end relationships; a means can also be valued as *part* of an end (as when I wear a tie because I want to be dressed up) or as the most defensible *specification* of an end (as when I wear my Mises Institute tie because I want to wear a tie). Such cases are sometimes called *constitutive* means; their relation to their ends is internal and logical, not external and causal. Once the possibility of constitutive means is recognized, the door is then open to nonutilitarian theories, like the classical eudaimonism of Aristotle and other Greek philosophers, that treat moral virtue as a constitutive rather than an instrumental means to happiness. Since constitutive means are as open to rational assessment as instrumental means, utilitarianism proves to have no advantage over classical eudaimonism in this regard. (As I have argued elsewhere [Long 2000], empiricism in epistemology leads almost inexorably to consequentialism in ethics, since the only connections between happiness and morality that can be identified *empirically* are external, causal ones.) Nor does

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social cooperation seem to exhaust the scope of morality; we can gain or lose respect for someone because of conduct that violates no norm of social cooperation.

Yeager tends to claim as a fellow utilitarian any thinker (e.g., David Hume) who allows utilitarian considerations any weight whatsoever. (As I read Hume's position, there are two kinds of virtues, the natural and the artificial, and only the latter is grounded on utilitarian considerations.) Indeed, Yeager interprets even the most stalwart opponents of utilitarianism as crypto-utilitarians. Plato's *Republic*, for example, is devoted to the question: why is it better to be a just person with a reputation for injustice than an unjust person with a reputation for justice? According to Yeager, Plato's reply is "in effect that the truth cannot remain unknown indefinitely; at least the gods will know it. The just man will fare well in this life eventually, and in the afterlife; the scoundrel will be found out and scorned" (p. 163). Yet this is precisely the reply that Plato explicitly rejects, arguing instead that a just soul is intrinsically worth having, regardless of what benefits accrue here or hereafter.

Similarly, Yeager portrays Immanuel Kant's categorical-imperative test as asking: "Would you like everyone in your situation to act on the maxim that you now propose to act on?" (p. 184). But for Kant the question is not what you would *like* (a sado-masochist might be willing to authorize all sorts of oddities as universal laws), but whether you can will the maxim without committing yourself to a logical inconsistency. (Hence it is, if not exactly false, at least seriously misleading to describe Kantian moral duties as "objective aspects of a reality independent of human desires" [p. 184], since rather than confronting us as external commandments, such duties are constituted by the logical implications of our own choices.) The problem with lying, for example, is not that it would have disagreeable results if practiced universally, but rather that the notion of a universal practice of lying is logically incoherent. Deceitful speech can succeed only by exploiting a general practice of truth-telling; it is thus the sort of thing that can only be an exception, not a rule. Thus by lying, I simultaneously commit myself *both* to willing lying as a rule (since I thereby treat lying as a reasonable option and so authorize lying generally) and to willing lying as an exception (since it is only as an exception that lying can occur). Whatever one may think of this argument, in making it Kant is certainly not "revealing himself, inconsistently, to be a crypto-utilitarian" (p. 232, n. 17), since although consequences are mentioned, the argument does not turn on any *evaluation* of those consequences.

Yeager expresses "outrage" (pp. 112, 151) at common misrepresentations of utilitarianism; but nonutilitarians might well feel that their theories fare little better at his hands. Yeager apparently shares with many utilitarians of my acquaintance an outlook that finds nonutilitarian positions utterly baffling and unfathomable, and so either reinterprets them as implicitly utilitarian or else rejects them as fantastic. Kant is a case in point; Yeager recycles the popular caricature of Kant as holding that it is better to act grudgingly from duty than to feel genuine benevolence: "An act is especially virtuous, on this view, if done *contrary* to one's own interest and inclination" (p. 183). (Yeager is at least in illustrious libertarian company; previous perpetrators of this caricature include Friedrich Schiller and Ayn Rand.) Yeager even cites, with apparent approval, Richard Taylor's bizarre remark (p. 184) that Kantian ethics is as repulsive as drowning babies for pleasure. (I'm not a Kantian myself, but speaking personally, I'll take Kant over recreational infanticide every time.) But Kant is *not* opposed to benevolent feelings; on the contrary, he insists that it is our duty to cultivate such feelings within ourselves in order to make it easier for us to act rightly. Kant's point is simply that making such feelings the sole basis of moral motivation

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leaves duty at the mercy of whatever psychological state I happen to be in at any given time. If my *only* reason for treating others rightly is that doing so makes me feel good, then I'm not really *committed* to morality; if I were to wake up tomorrow in a thoroughly depressed mood, so that I no longer found moral behavior emotionally fulfilling, I could no longer be counted on to do the right thing. Kant's moral ideal is not the person who joylessly performs her duty, but the person whose performance of duty, however joyful, does not *depend* on her being able to take joy in it; acting against inclination is *evidence* of, not a *requirement* of, moral worth.[5]

Yeager treats the charge that utilitarians care too little for rules (pp. 144-52) and the charge that they care too much for rules (pp. 154-56) as though they were two unrelated criticisms; but they are best understood as two halves of a single argument, which is this: there are possible cases, however infrequent, in which one could best promote utility by committing (not just any rule-violation but) a morally horrific rule-violation. In such a case, if a moral theory recommends the rule-violation, it is a bad theory; and if it does not recommend the rule-violation, it is no longer utilitarian. We've seen that Yeager objects to such "cooked-up cases" as unrealistic; but why does it matter whether the cases are realistic? (Yeager does not claim that they are *impossible*.) The role of cooked-up cases is in arguments of the following form: "In cooked-up case X, it would be wrong to do Y; but moral theory Z entails that in cooked-up case X, it would be right to do Y; therefore moral theory Z is wrong." No claim that the cooked-up case is realistic or likely occurs as either a premise or a presupposition of the argument; hence one does no damage to the argument by impugning the realism of the cooked-up case. (Yeager will of course question the anti-utilitarian's certainty that action Y is indeed morally prohibited; is this not a mere intuition, of no probative force? But that is a different point; and in any case, as we've seen, no judgment that issues from reflective equilibrium is a *mere* intuition, but on the contrary has the same epistemic status as the deliverances of science.)

But how, Yeager asks, can the anti-utilitarian be justified in her confidence that certain moral values must be maintained come what may? Because economists understand the concepts of tradeoffs and marginal utility, the notion of a moral absolute that must be upheld at all costs is, Yeager tells us, "foreign to an economist" (p. 13). But should it be? Since economic values are ordinal, not cardinal, economic marginalism by no means rules out the possibility of two goods being so related that any amount of one will be preferred to any amount of the other; and reflective equilibration may well favor such an outcome. (Given that Yeager's argument is directed *inter alia* at Rothbard, it is perhaps ironic that Rothbard himself employed a similar argument (Raimondo 2000, p. 113) against the moral absolutism of Yeager's fellow consequentialist Ayn Rand.)

Yeager sees the anti-utilitarian as taking a somewhat offensive holier-than-thou attitude: "The critic, so runs his veiled hint, would never act so shamefully; he is nobler than the crass utilitarians" (p. 148). But the wrongness of action Y is not meant to be something only the anti-utilitarian recognizes; rather, it is assumed to be something that the utilitarian likewise grants (as indeed is evidenced by the utilitarian's eagerness to show that utilitarianism does not in fact recommend action Y), and the

[5]Yeager's interpretation of Kant may have been led astray through relying only on the *Groundwork for the Metaphysics of Morals* and not on its sequel, the *Metaphysics of Morals* itself, where Kant explains his standpoint somewhat more clearly.

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objection is meant to expose a tension between utilitarian theory and the utilitarian's other moral values. Intellectual *persuasion*, like intellectual *inquiry*, takes the form of reflective equilibration, or the Socratic method; each seeks out unexploited profit opportunities, whether in one's interlocutor's belief set or in one's own. The critic's claim is not "I have a better moral character than yours" but "I have a better moral theory than yours"—not "you have the wrong values" but "your values are in disequilibrium with your official theory."

Reflection on praxeological principles may be useful here in seeing what cooked-up cases are meant to show. Whatever I choose, I choose either as a consumer's good (a first-order good) or as a producer's good (a higher-order good). Utilitarianism of any sort regards morality as a producer's good, a means of producing happiness; but *indirect* utilitarianism maintains, in effect, that the most effective way to promote happiness is to treat morality *as if* it were a consumer's good, even though it isn't one. But is it really possible to adopt the attitude that indirect utilitarianism recommends? When I choose morality "as if" it were a consumer's good, either it really *becomes* a consumer's good for me, or else it remains a producer's good and I am only pretending. There is no third possibility.

Suppose it does become a consumer's good for me. In that case, I am no longer a consistent utilitarian, since in my actions I reveal a preference for morality as an end in itself. Yeager recommends treating a principle as inherently binding at the everyday level while recognizing its contingency on utilitarian outcomes at the reflective level (pp. 294-95); but doesn't this just amount to advising us to form inconsistent preferences? And if the preferences on which I ordinarily act do treat morality as a consumer's good, in what sense can it be said that I *really* regard it as a producer's good? On the other hand, suppose that morality remains a producer's good for me. Following Mises, we may say that every action embodies a means-end scheme; in that case, even when I choose to act morally, my choice commits me to rejecting morality in counterfactual situations—cooked-up cases—where immorality would be a more effective means to the end, and this commitment is a blot on my character *now*. (Hence the Kantian insistence on the importance of *maxims* rather than actions.)

It has often been claimed that indirect utilitarianism is unstable, and must collapse either into direct utilitarianism on the one hand or into "rules fetishism" on the other. This can be interpreted as a psychological claim about the likely results of trying to maintain a utilitarian attitude, in which case its truth or falsity is an empirical matter. By transposing the familiar stability objection into a praxeological key, however, what I've been trying to show is that indirect utilitarianism is not just causally but *conceptually* unstable. If I treat morality as a consumer's good, I must reject utilitarianism on pain of inconsistency; if I treat morality as a producer's good, I thereby exhibit a moral character or disposition that utilitarian considerations themselves condemn. But I must treat morality in one way or the other; hence utilitarianism is praxeologically self-defeating. The praxeologist cannot be a *direct* utilitarian, since praxeological reasoning itself shows us that the utilitarian's goal depends on social cooperation, which in turn requires the kind of stable and consistent commitment to principles that a direct utilitarian cannot have. Nor can the praxeologist be an *indirect* utilitarian, since praxeological considerations force a choice between treating morality as a producer's good (in which case we're back with direct utilitarianism) and treating it as a consumer's good (in which case utilitarianism prescribes its own rejection). We may have utilitarian reasons for *adopting* moral commitments, but once we *have* adopted them, we can no longer regard them

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as resting on purely utilitarian foundations—because so regarding them would alter their status as commitments.

Like any reviewer, I've stressed my areas of disagreement with Yeager's book; but there is certainly much in it that I value. Few will deny that utilitarian considerations are *relevant* to moral assessment, even if they do not *exhaust* the domain of what is thus relevant. Yeager's analysis shows convincingly that one can give utilitarian considerations quite a *strong* weight and still defend both common-sense morality and a libertarian social order. This needs showing; for the notion that utilitarianism requires the sacrifice of ordinary ideas about common decency and individual rights is not confined to utilitarianism's critics, but is sometimes trumpeted by utilitarians themselves. (One thinks of Peter Singer, for example.) Yeager thus offers us a way of meeting utilitarian arguments for bad policies. On the nonutilitarian side of things, theorists often practice reflective equilibrium without taking the insights of economic science into account, spinning belief systems that are desperately in need of an exogenous praxeological shock; Yeager offers us a way of meeting their arguments as well.

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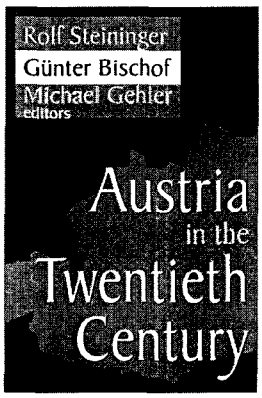

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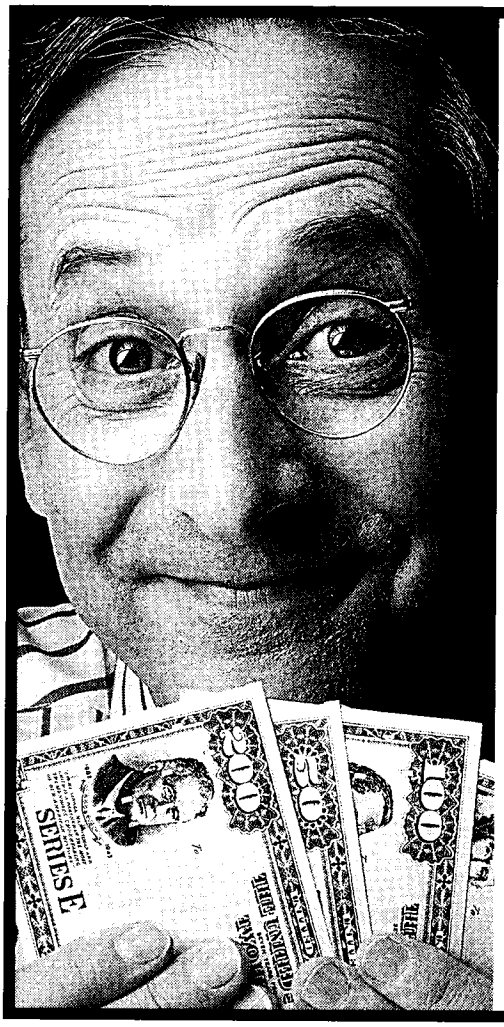

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